

AMLEBRRE 65-46R

~~Henderson~~ Wallin

ARGONNE NATIONAL LABORATORY  
Idaho Division

Report of

EBR-II OPERATING DATA

October 1, 1965 through December 31, 1965



Argonne National Laboratory

IDAHO FACILITIES  
IDAHO FALLS, IDAHO

P. O. BOX 2528  
IDAHO FALLS 822-4400

LONG DISTANCE CALLS  
SCOVILLE, STATION 8

March 17, 1966

TO: Distribution

FROM: L. P. Barnes *L.P. Barnes*

SUBJECT: EBR-II Operating Data Report, dated February 28, 1966.

Please make the following change in the subject report:

Page One, SUMMARY. Change item 2 of the second paragraph  
to read:

2. "Flow through the primary sodium cold trap has gradually  
reduced to a point which indicates plugging with sodium oxide. By changing  
operating parameters of the cold trap, it was possible to improve the  
flow somewhat."

LPB/mwr

Distribution:

L. P. Barnes	E. Hutter	C. H. Scheibelhut
J. D. Cerchione	F. S. Kirn	R. N. Smith
D. W. Cissel	E. W. Laird	R. R. Smith
D. C. Cutforth	J. D. Leman	T. R. Spalding
J. R. Davis	I. O. Monson	F. H. TeBeau
G. E. Deegan	K. J. Moriarty	F. W. Thalgott
I. A. Engen	F. D. McGinnis	M. B. Trillhaase
J. K. Greene	R. Neidner	J. B. Waldo
D. G. Hinckley	C. L. Nelson	G. K. Whitham (3)
H. Hurst	M. Novick	Files
R. W. Hyndman ✓	W. H. Perry	TSG
R. A. Jaross	J. S. Remsburg	PRF
F. H. Just	W. J. Richardson	FF



## TABLE OF CONTENTS

	<u>Page</u>
Summary	1
Chronology of Principal Events	3
Fuel Handling	6
References	47
Table I      Mark 1 Fuel Surveillance Program	6
Table II     Fuel Handling Operations	8
Table III    Scram Summary	16
Table IV    Operating History Data	17
Figure 1A    Integrated Thermal and Electrical Power, October 1965	20
Figure 1B    Integrated Thermal and Electrical Power, November 1965	21
Figure 1C    Integrated Thermal and Electrical Power, December 1965	22
Figure 2A    Cumulative Critical Time, Generator On Time, and Electrical Power Level, October 1965	23
Figure 2B    Cumulative Critical Time, Generator On Time, and Electrical Power Level, November 1965	24
Figure 2C    Cumulative Critical Time, Generator On Time, and Electrical Power Level, December 1965	25
Figure 3A    Reactor Power, Reactor $\Delta T$ and Primary Flow, October 1965	26
Figure 3B    Reactor Power, Reactor $\Delta T$ and Primary Flow, November 1965	27
Figure 3C    Reactor Power, Reactor $\Delta T$ and Primary Flow, December 1965	28
Figure 4A    Steady-State Subassembly Outlet Temperatures October 1965	29
Figure 4B    Steady-State Subassembly Outlet Temperatures November 1965	30



TABLE OF CONTENTS (Continued)

		<u>Page</u>
Figure 4C	Steady-State Subassembly Outlet Temperatures December 1965	31
Figure 5A	Steam Header Temperature and Pressure October 1965	32
Figure 5B	Steam Header Temperature and Pressure November 1965	33
Figure 5C	Steam Header Temperature and Pressure, December 1965	34
Figure 6A	Secondary Purification System Plugging Temperature and Flow, October 1965	35
Figure 6B	Secondary Purification System Plugging Temperature and Flow, November 1965	36
Figure 6C	Secondary Purification System Plugging Temperature and Flow, December 1965	37
Figure 7A	Cover Gas Activity, October 1965	38
Figure 7B	Cover Gas Activity, November 1965	39
Figure 7C	Cover Gas Activity, December 1965	40
Figure 8A	Primary Cover Gas-Hydrogen and Nitrogen Content, October 1965	41
Figure 8B	Primary Cover Gas-Hydrogen and Nitrogen Content, November 1965	42
Figure 8C	Primary Cover Gas-Hydrogen and Nitrogen Content, December 1965	43
Figure 9A	Secondary Sodium Flow and Secondary Pump "Efficiency", October 1965	44
Figure 9B	Secondary Sodium Flow and Secondary Pump "Efficiency", November 1965	45
Figure 9C	Secondary Sodium Flow and Secondary Pump "Efficiency", December 1965	46

житиїв, які використані в  
загальному вигляді для монет  
Світлого, відомих з 1802  
загальній виглядом які використані в  
загальному вигляді  
загальній виглядом які використані в  
загальному вигляді

Summary

A total of five power runs at 45 Mwt for fuel burnup were conducted during the report period. The incremental burnup for the calendar quarter was 1728 MWd for a total of 5050 MWd since the approach to power.

Following is a list of the most significant problems and/or failures which affected plant operation during the report period:

1. The inflatable seal on the inner door to the Reactor Building personnel air lock failed on October 16. Entry to the building was through the emergency air lock until repairs were completed.

2. Flow through the primary sodium cold trap has gradually reduced to a point which indicates plugging with sodium oxide. Flow improved as the bulk sodium plugging temperature was reduced by cold trapping.

3. Difficulty with the FUM was encountered while fuel handling after completion of Run #10. The FUM gripper Mark II was removed for cleaning and inspection because of faulty sensing rod indications. The Mark I gripper was installed and it stuck in a fuel transfer port. An accumulation of sodium and/or sodium oxide in the Fuel Unloading Port caused the sticking problem.

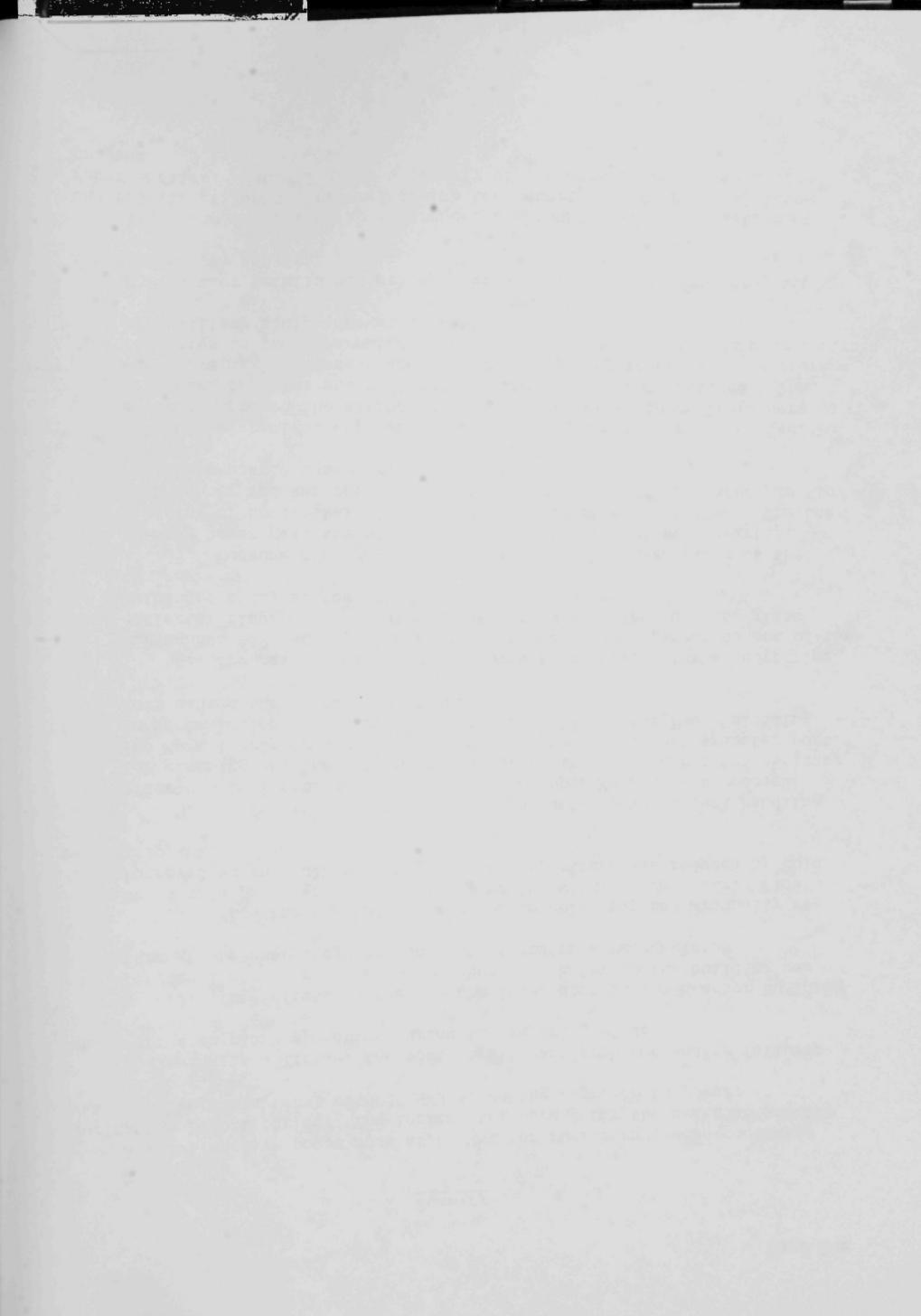
4. The main generator was removed from service for a short time during Run #12 because of a broken retainer ring adjacent to one of the collector rings on the excitor. Repairs were effected using glass twine and epoxy as recommended by the generator vendor.

5. Because of high xenon background in batch sampling of the primary cover gas, the cover gas was purged in December. Partial plugging of nozzle N-1 with sodium was evident at that time. The one inch center rod was removed from the plug to permit increases gas flow until the nozzle can be removed and cleaned.

6. A chemical explosion inside the equipment airlock on Dec. 26 severely damaged the airlock door on the reactor side. There were no personnel injuries and radioactive material was not involved. The explosive mixture was apparently produced by hydrogen from the storage batteries on the interbuilding coffin. No damage to the reactor controls or auxiliary equipment was evident.

For further details concerning these and other plant problems, see references 3,4, and 5.

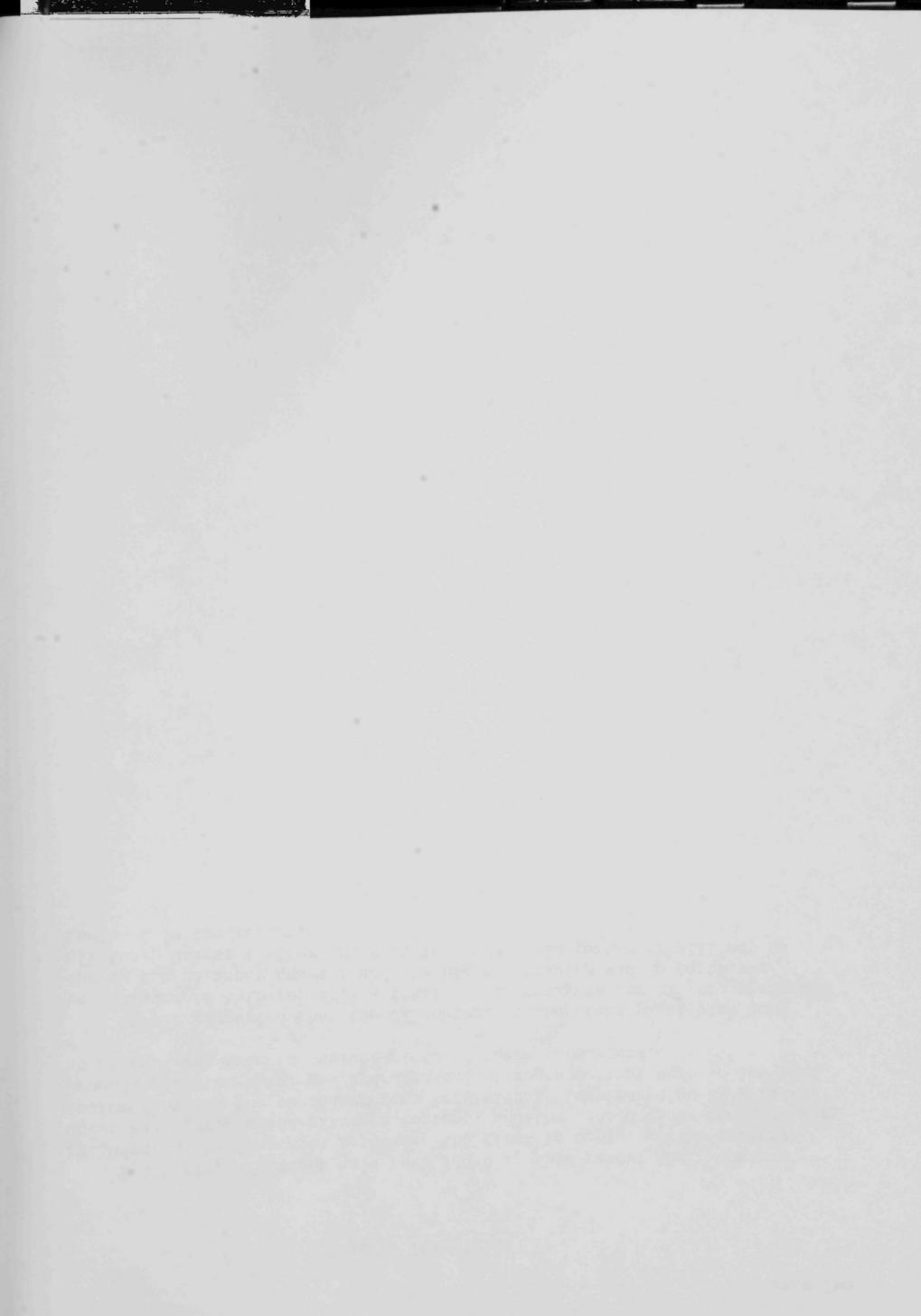
Attention is invited to references 6 through 10 for information on the results of tests performed during the report period on surveillance subassemblies. Table I gives a summary of the Mark I fuel surveillance program.



Summary (Continued)

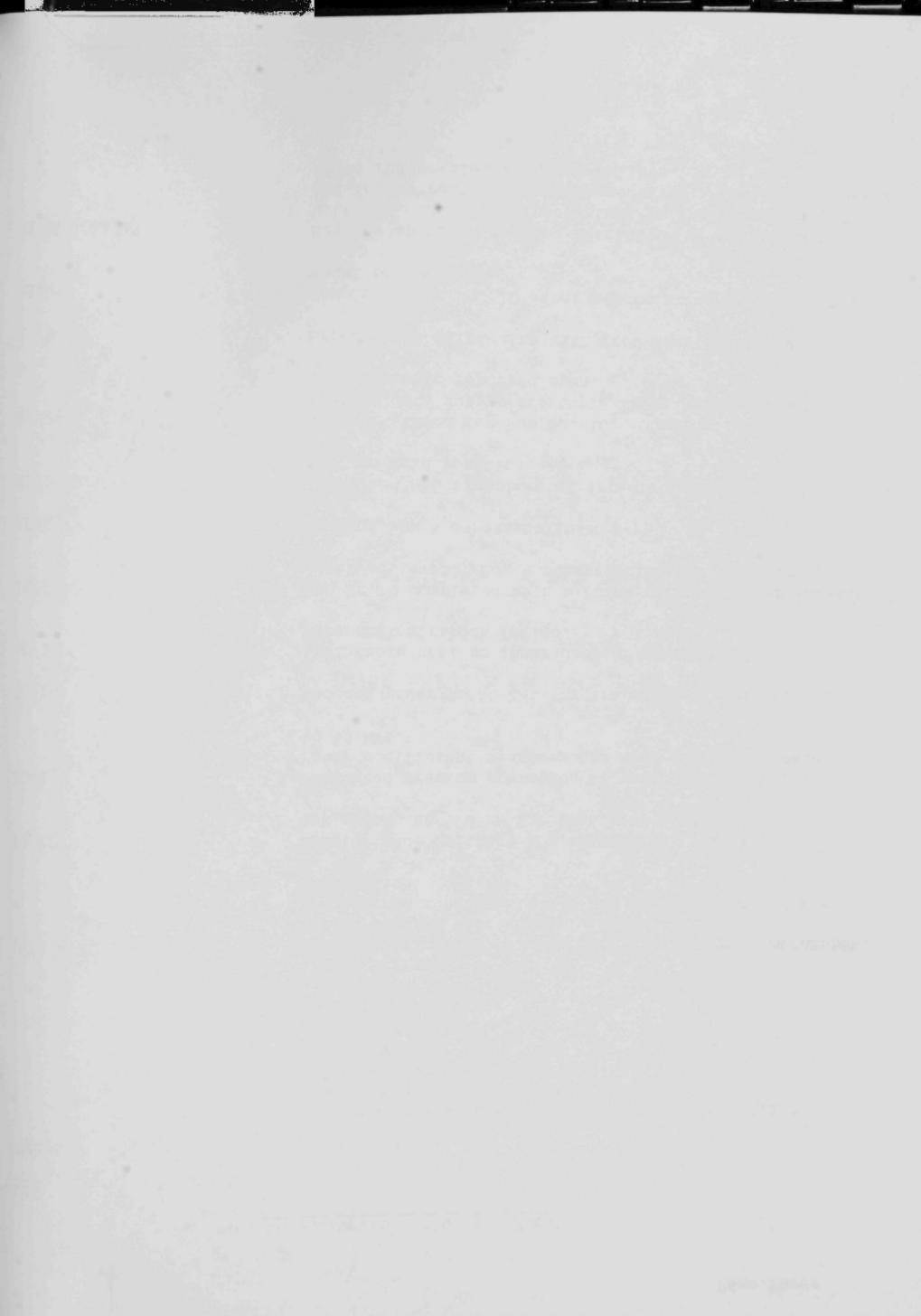
Two series of graphs have been added in this report that were not included in previous data reports. The first is a plot of the primary cover gas hydrogen and nitrogen content, and the second shows the secondary sodium flow and the secondary pump "efficiency" (expressed as kW/% flow). Secondary sodium cover gas hydrogen and nitrogen content were so low that no attempt was made to include plots of these parameters.

It was suggested that the Cl<sup>-</sup> content of the steam plant blow down be included in this report. A total of six analyses for Cl<sup>-</sup> were performed during the calendar quarter and the highest reading was 26 parts per billion. Unless further interest is shown, this parameter will not be included in the report.



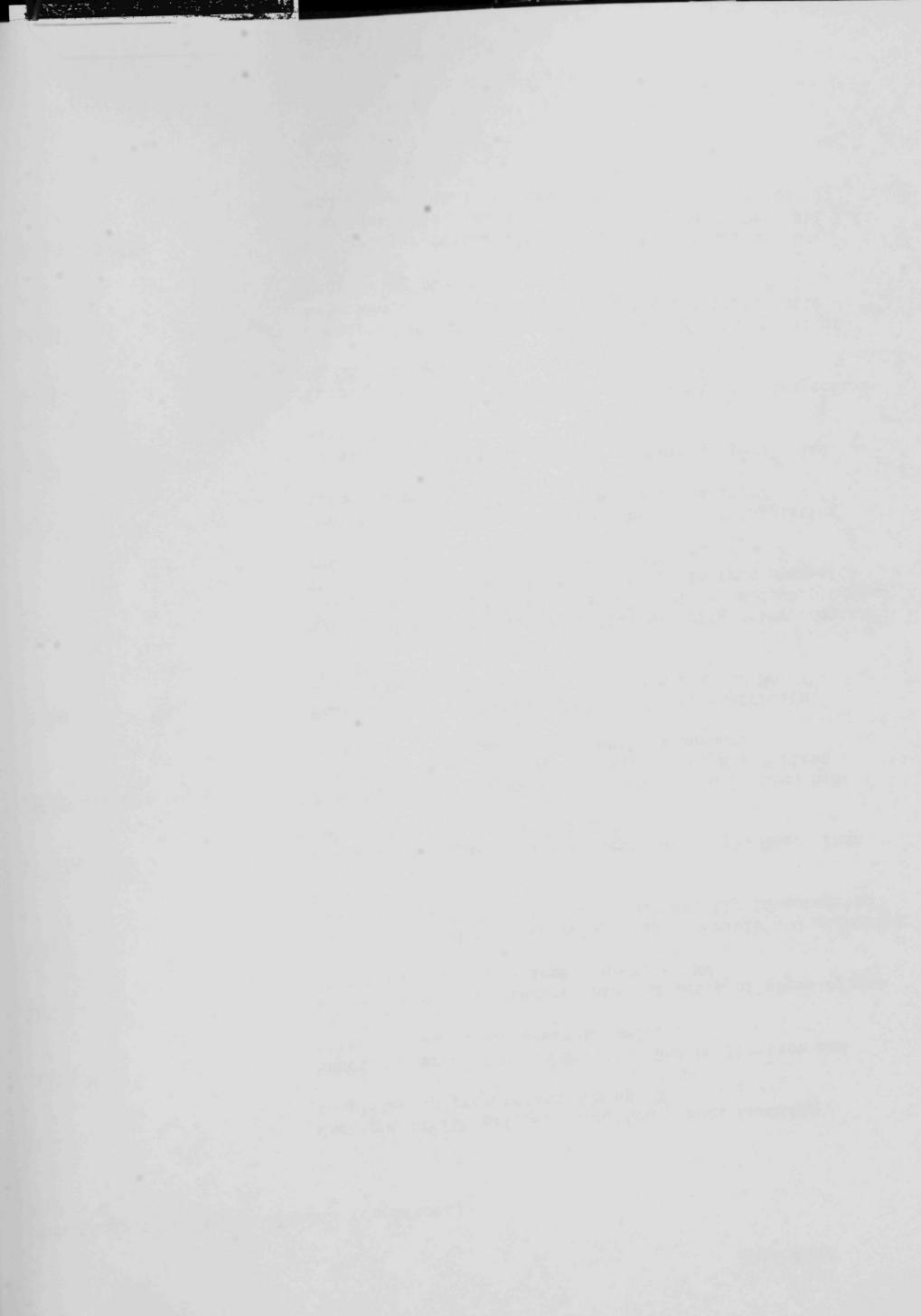
Chronology of Principal Events

<u>Date</u>	<u>Event</u>
10/1/65	Plant Conditions: Reactor shutdown awaiting results of inspection of surveillance subassemblies. Primary Na Temperature                    700°F Primary Flow                                13% Secondary Flow                              0.8% Steam Pressure                              1170 psig Electrical Heat Input                      420 kW
10/1 - 10/6	Continued cleaning of control rod No. 9 drive mechanism. Failed bellows discovered. Transferred subassemblies C-104 and C-142 to FCF for examination.
10/12	Reactor made critical for trapezoidal reactivity variations at 500 kW for stability studies.
10/13	Commenced reactor operation at power for Run No. 9. Power coefficient measurements made during increase to 45 Mwt.
10/14	Reduced power to 40 Mwt for trapezoidal oscillations.
10/16	Inflatable seal on inner door of reactor building personnel air lock failed.
10/21	Run No. 9 completed with a total of 3665 MWD integrated power achieved. Row 4 subassemblies at 1.2% burnup.
10/27	Removed row 4 subassemblies.
10/28	Installed ANL experimental irradiation subassembly XAO7 in grid position 4-D-2.
10/29	Reactor started for Run No. 10. Obtained power coefficient data during startup. Three heater elements in W-2 nozzle reported open.
11/4	Experienced difficulty with feedwater control valve 596.
11/7	Completed Run No. 10 after accumulating 315 MWD for a total of 3980 MWD.
11/8 - 11/17	Reactor shutdown pending resolution of difficulties with FUM. Mark I gripper stuck in fuel transfer port and faulty sense indication received. Control Rod No. 9 drive reassembled with new bellows.



Chronology of Principal Events (Continued)  
Page - 2

- 11/18                    Checkout of FUM gripper completed. Fuel handling completed in preparation for Run No. 11.
- 11/19                    Reactor started for Run No. 11. Rod calibration and total rod worth measurements made.
- 11/20                    Power coefficient measurements and tests of steam bypass system made at power levels up to 45 MW.
- 11/22                    Automatic synchronizing relays made operable and generator was paralleled with site loop successfully in automatic mode.
- 11/27                    Run No. 11 completed after accumulating 300 MWD. This run made a total of 4280 MWD.
- 11/28 - 11/29            Removed nine subassemblies in Rows 4 and 5 which had reached 1.2% burnup. Also removed from Row 2 first reprocessed subassembly to reach 1% burnup.
- 11/29                    Started reactor for Run No. 12. Power coefficient measurements and calibration of control rod No. 7 obtained.
- 12/3                    Reinstallation of primary sodium plugging meter completed and purification system started. Primary sodium plugging temperature measured to be 370°F. Cold trap operation reduced plugging temperature to 270°F.
- 12/4                    Generator taken off the line. Section of insulating tape broken on collector assembly of excitor.
- 12/7                    Repairs completed on excitor. Generator paralleled with site power.
- 12/8                    Turbine generator shutdown and restarted for inspection by GE representative.
- 12/11                    Completed Run #12. Accumulated 470 MWD for total of 4750 MWD. Performed power coefficient tests while decreasing power.
- 12/12 - 12/13            FUM gripper reinstalled. Replaced a total of 10 subassemblies, including 5 control rods. One Mark 1-A and experimental subassembly XA08 were also loaded.



Chronology of Principal Events (Continued)  
Page - 3

- 12/14 - 12/15                    Run # 13A performed to obtain additional physics data. Trapezoidal oscillations performed at 50 KW and 40 MW.
- 12/16                            Purged primary tank cover gas to reduce Xenon background.
- 12/17 - 12/24                    Run #13 accumulated 300 MWD for total of 5050 MWD.
- 12/26                            Chemical explosion occurred in equipment air lock, severely damaging reactor side door. Source coffin and one new primary tank heater thimble also damaged.
- 12/27 - 12/31                    Investigation of possible damage to reactor controls and fuel handling systems. Fuel handling checks, reactor interlock and scram circuit checks revealed no damage.
- 12/31                            Plant Conditions:
- Reactor shutdown for investigation of damage from airlock explosion and preparation for containment integrity tests.
- |  |           |
|--|-----------|
| Primary Sodium temperature             | 699°F     |
| Primary flow                           | 5%        |
| Secondary flow                         | 0.4%      |
| Steam pressure                         | 1258 psig |
| Electrical heat input (primary system) | 308 KW    |



TABLE I

EBR-II  
MARK I FUEL SURVEILLANCE PROGRAM  
(Through Dec. 31, 1965)

OPERATING RUN	DATE		MEGAWATT DAYS		BURNUP		SUBASSEMBLIES REMOVED					
	From	To	Total At Shutdown	Increment	Max	Increment	A	B	C	L	S	U
1	8-1-64	8-23-64	343	343	0.1	0.1	718		115			
2	10-2-64	10-19-64	705	362	0.25	0.15	744	303 304	140	406		1251
3	3-15-65	4-10-65	1280	575	0.4	0.15			112 143			
4	4-24-65	5-4-65	1631	351	0.6	0.2	750		122	413		
5	5-10-65	5-21-65	2003	372	0.8	0.2	736		103 131			1079 1091
6	5-24-65	6-25-65	2502	499	.96 1.0	0.2	705 727	314	138 145 141	410	601	1061 1441
7	7-29-65	8-15-65	2927	425	1.06	0.1			136		602	
8	9-7-65	9-19-65	3320	393	1.21 EST	0.15			104 142 117			

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64
65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96
97	98	99	100	101	102	103	104

TABLE I (Cont.)

EBR-II  
MARK I FUEL SURVEILLANCE PROGRAM  
(Through Dec. 31, 1965)

DATE			MEGAWATT DAYS		BURNUP		SUBASSEMBLIES REMOVED					
OPERATING RUN	From	To	Total At Shutdown	Increment	Max	Increment	A	B	C	L	S	U
9	10-13-65	10-21-65	3665	345	1.2 EST							
10	10-28-65 0945	11-7-65	~3980	321 (315 Prog)	1.2 EST	.1	6C3 B306	107 (4) 113	(5) 411			
11	2230 11-18-65	11-27-65	~4280	300		.1		101				
12	11-30-65	12-11-65 2400	4750	470		.18	747 774	132 102 135 168 152	407 415 405 403 401			
13	12-17-65 1440	12-24-65 1230	5050	300			711	305 311 300 302 316 301 313	158	414		

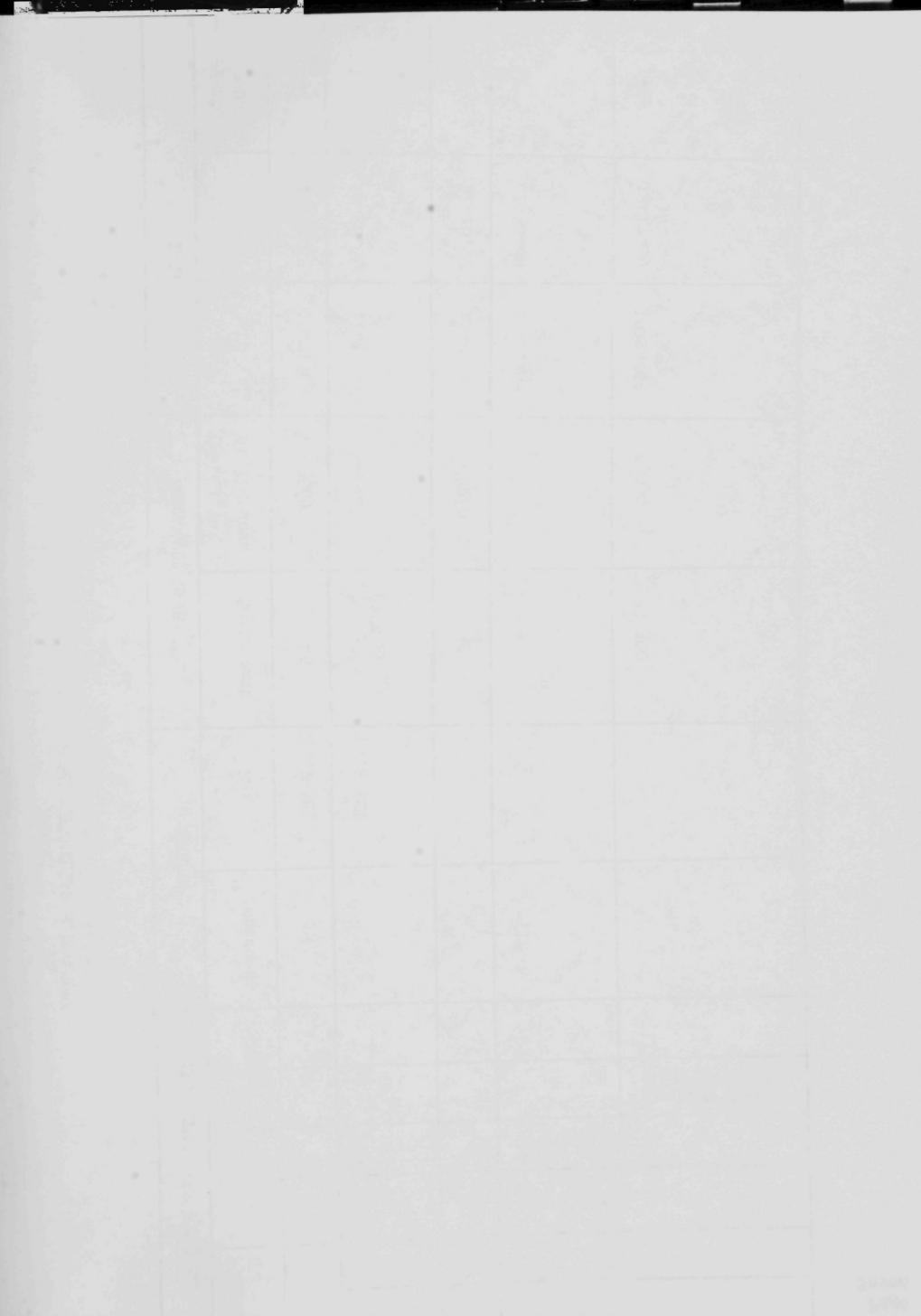


TABLE II

## Fuel Handling Operations

<u>Loading Inst. No.</u>	<u>Date</u>	<u>Grid Position</u>	<u>Basket Position</u>	<u>Subass'y No.</u>	<u>Transfer.</u>
226-B	10-7-65		224	C-204	FUM to basket.
226-D	10-8-65		206	C-205	FUM to basket.
227	10-9-65	5-A-3 5-B-1 5-A-3 5-B-1	110	SDC L-416 L-416 SDC	Grid to basket. Grid to transfer Point. Transfer Point to Grid. Basket to grid.
229	10-9-65	6-D-2 6-D-2 4-C-2 4-C-2 4-E-2 4-E-2		XAO1 XAO1 XG05 XG05 XG06 XG06	Grid to transfer point. Transfer point to Grid. Grid to transfer point. Transfer point to Grid. Grid to transfer point. Transfer point to Grid. XAO1, XG05 & XG06 was rotated 180 degrees)
228	10-9-65	2-E-1 2-E-1 2-C-1 2-C-1 2-A-1 2-A-1 2-B-1 2-B-1 2-R-1 3-B-1 3-T-1 3-C-2 3-C-2 3-E-1 3-E-1 3-E-2 3-E-2	326 215 215 222 222 212 212 329 329 314 314 316 316 316 224 206	C-117 C-174 C-118 C-131 C-119 C-191 C-128 C-194 C-121 C-204 C-139 C-202 C-137 C-204 C-134 C-205	Grid to basket. Basket to Grid. Grid to basket. Basket to Grid. Basket to Grid. Basket to Grid.
226-C	10-8-65		306	C-147	Basket to FUM.
230	10-12-65		326	C-117	Basket to FUM.
230-A	10-13-65		326	C-206	FUM to basket.
230-B	10-14-65		108	L-400	Basket to FUM.
230-C	10-18-65		206	C-200	FUM to basket.
230-D	10-20-65		220	C-144	Basket to FUM.
230-E	10-20-65		220	C-164	FUM to basket.
230-F	10-21-65		208	C-119	Basket to FUM.

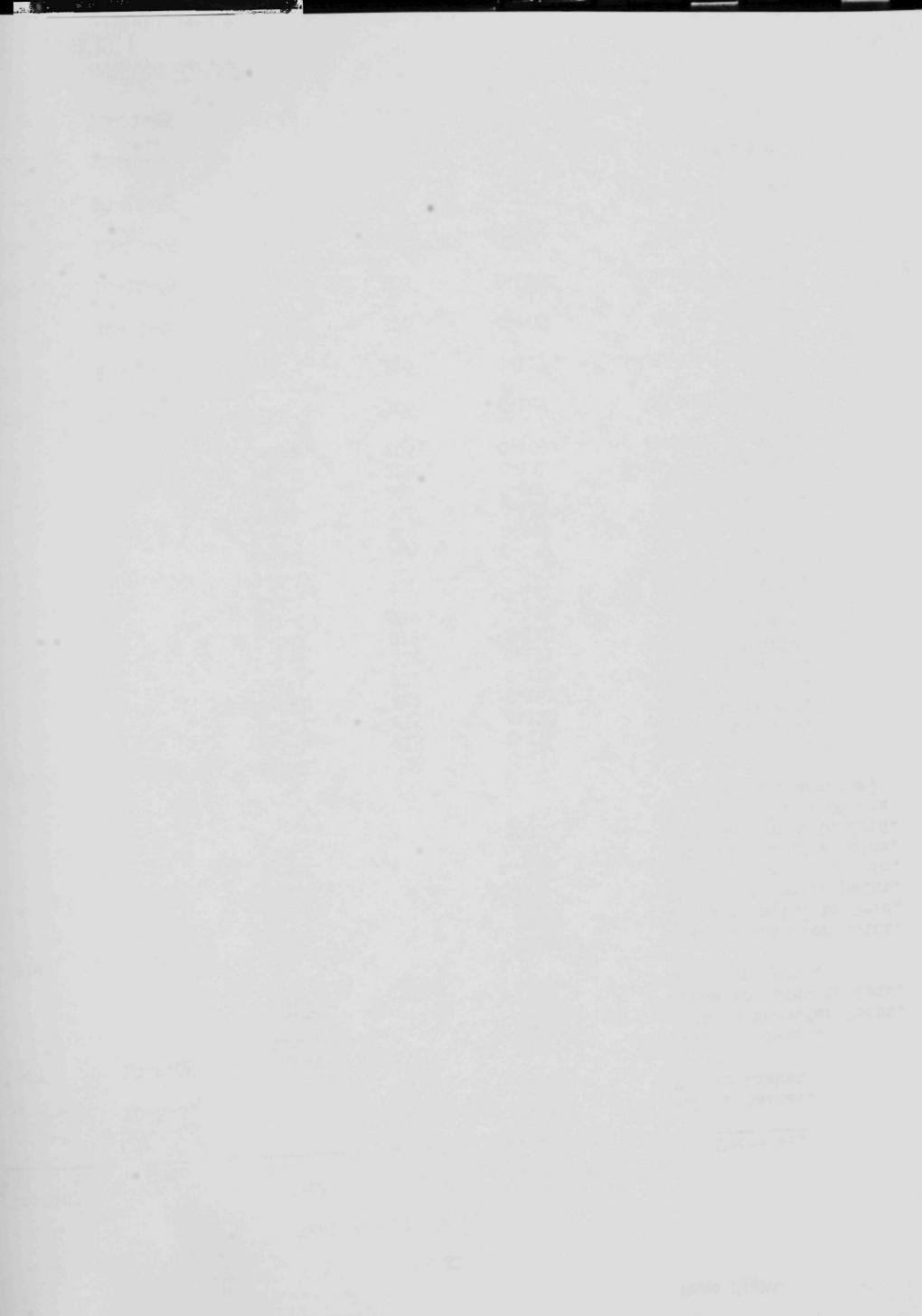


Table II. (continued.)

230-G	10-22-65	208	C-170	FUM to basket.	
230-H	10-22-65	223	C-151	Basket to FUM.	
230-K	10-23-65	212	C-128	Basket to FUM.	
230-L	10-25-65	316	C-137	Basket to FUM.	
231	10-27-65	l-A-1 l-A-1 l-A-3 l-A-3 l-B-2 l-B-2 l-B-3 l-B-3 l-D-1 l-D-1 l-D-2 l-D-2 l-D-3 l-D-3 l-D-3 l-F-1 l-F-1 S-F-3 S-F-3	223 207 207 222 222 329 329 329 226 226 215 215 330 330 303 303 303 224 104 104	C-126 C-150 C-109 C-119 C-124 C-121 C-113 C-152 C-125 C-118 C-114 C-123 C-111 C-135 C-105 C-134 L-411 L-419	Grid to basket. Basket to Grid. Grid to basket. Basket to Grid. Grid to basket. Basket to Grid. Grid to basket. Grid to basket. Grid to basket. Grid to basket. Basket to Grid. Grid to basket. Grid to basket. Grid to basket. Basket to Grid. Grid to basket. FUM to Grid.
232	10-28-65	7-B-4 7-B-4	203 204	A-776X A-733	Grid to basket. Basket to Grid.
233	10-28-65	l-D-3 l-D-3 6-A-2 6-A-2 6-C-2 6-C-2	204 204 212 210 210 324	C-135 XA07 A-717 B-318 A-720 B-319	Grid to basket. FUM to Grid. Grid to basket. Basket to Grid. Grid to basket. Basket to Grid.
234	10-28-65	S-B-4 S-B-4	306 204	C-107 C-135	Grid to basket. Basket to Grid.
230-N	11-3-65		314	C-139	Basket to FUM.
235	11-5-65		314	C-207	FUM to basket.
235-A	11-5-65		329	C-113	Basket to FUM.
235-A1	11-5-65		329	C-113	FUM to basket.
235-C	11-8-65		306	C-107	Basket to FUM.
235-C1	11-8-65		306	C-107	FUM to basket.
236	11-9-65	l-A-1	324	C-150	Grid to basket.

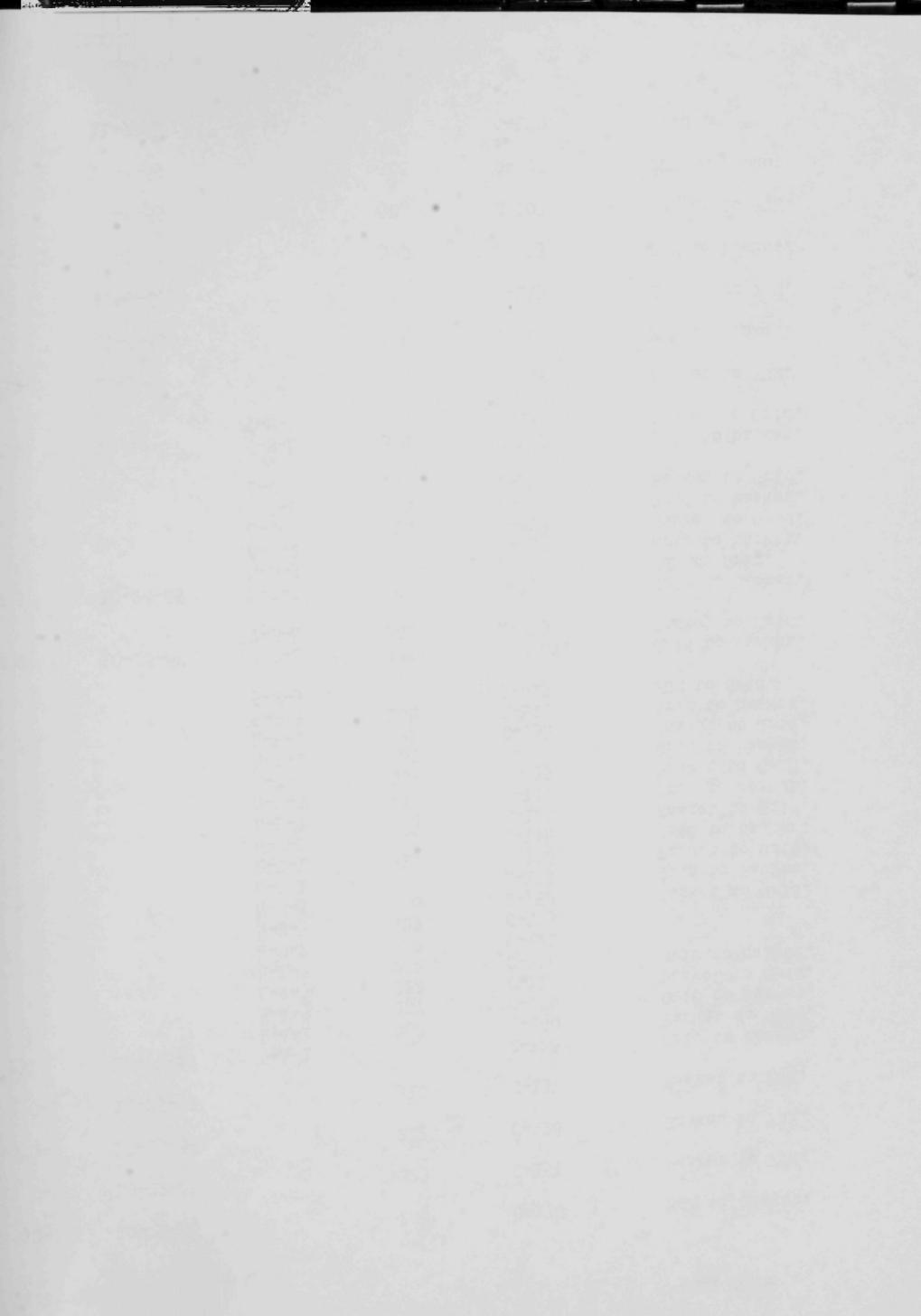


Table II. (continued.)

236	11-9-65	4-A-1 4-A-3 4-A-3 4-C-3 4-C-3 4-D-1 4-D-1 4-E-3 4-E-3 5-B-3 5-B-3	221 221 220 220 208 208 206 206 326 124 106	C-102 C-119 C-164 C-110 C-170 C-118 C-200 C-108 C-106 L-409 L-404	Basket to Grid. Grid to basket. Basket to Grid.
237-	11-18-65		108 326	L-420 B-316	FUM to basket. FUM to basket.*
235-G	11-18-65		306	C-107	Basket to FUM.
236-A	11-18-65	6-C-3 6-C-3 5-D-3 5-D-3	323 326 106 108	B-306 B-316 L-408 L-420	Grid to basket. Basket to Grid. Grid to basket. Basket to Grid.
235-B	11-22-65		303	C-105	Basket to FUM.
235-C	11-22-65		316	C-208	FUM to basket.
235-F	11-22-65		303	C-209	FUM to basket.
235-K	11-22-65		306	C-211	FUM to basket.
235-Q	11-23-65		313	B-306	Basket to FUM.
235-R	11-23-65		313	C-210	FUM to basket.
235-S	11-23-65		216	C-212	FUM to basket.
235-E	11-24-65		207	C-109	Basket to FUM.
235-X	11-24-65		224	C-159	FUM to basket.
235-U	11-24-65		207	C-156	FUM to basket.
238	11-29-65	5-F-4 5-F-4 5-A-2 5-A-2 5-A-4 5-A-4 5-D-4 5-D-4 5-E-3 5-E-3 5-F-4 5-F-4	227 201 314 314 316 316 316 303 303 306 306 313	C-120 C-154 C-133 C-207 C-116 C-208 C-101 C-209 C-106 C-211 C-127 C-210	Grid to basket. FUM to Grid. Grid to basket. Basket to Grid. Basket to Grid. Grid to basket. Basket to Grid. Grid to basket. Basket to Grid. Basket to Grid. Grid to basket. Basket to Grid.



Table II. (continued.)

238	11-29-65	4-F-1 4-F-1 4-B-2 4-B-2 2-F-1 2-F-1 6-A-2 6-A-2	313 216 216 224 224 207 207 212	C-134 C-212 C-121 C-159 C-162 C-156 B-318 A-717	Grid to basket. Basket to Grid. Grid to basket. Basket to Grid. Grid to basket. Grid to basket. Basket to Grid. Basket to Grid.
238-A	11-29-65	5-F-2 5-F-2	328 328	C-129 C-129	Grid to basket. Basket to Grid.
238-B	11-29-65		212	C-193	FUM to basket.
238-C	11-29-65	5-F-2 5-F-2	328 212	C-129 C-193	Grid to basket. Basket to grid.
235-H	11-30-65		330	C-111	Basket to FUM.

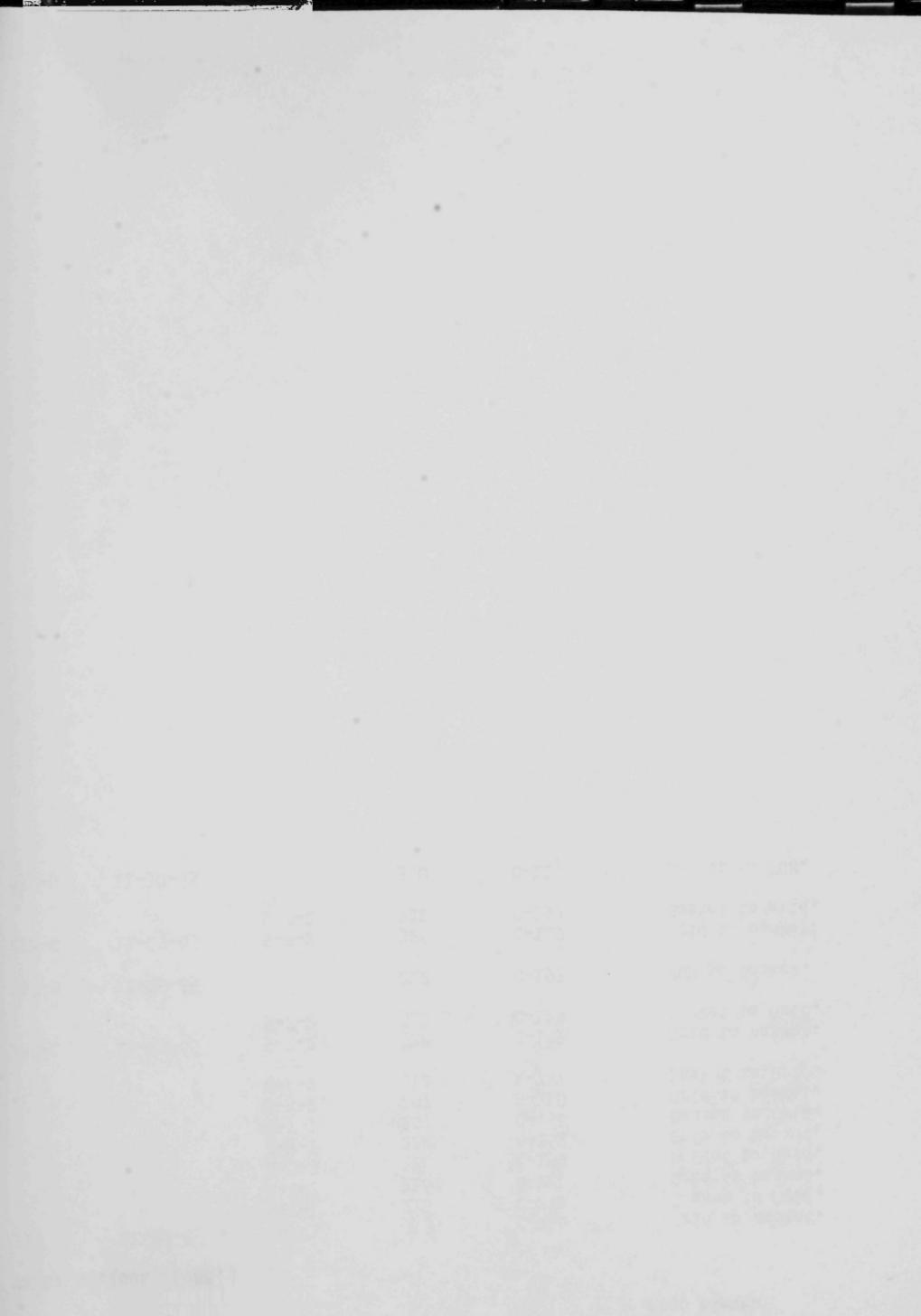


Table II. (continued.)

<u>Loading Inst. No.</u>	<u>Date</u>	<u>Grid Position</u>	<u>Basket Position</u>	<u>Subass'y No.</u>	<u>Transfer.</u>
235-T	12-1-65		330	C-155	FUM to basket.
235-A	12-1-65		329	C-113	Basket to FUM.
235-L	12-2-65		215	C-114	Basket to FUM.
235-W	12-3-65		215	C-161	FUM to basket.
239	12-5-65		120	L-421	FUM to basket.
239-A	12-5-65		122	L-422	FUM to basket.
239-B	12-6-65		128	L-423	FUM to basket.
239-C	12-6-65		108	L-424	FUM to basket.
239-D	12-6-65		110	L-425	FUM to basket.
235-M	12-6-65		222	C-124	Basket to FUM.
235-N	12-6-65		226	C-125	Basket to FUM.
235-Y	12-7-65		212	C-165	FUM to Pasket.
240-P	12-8-65		226	C-166	FUM to basket.
235-P	12-8-65		223	C-126	Basket to FUM.
240	12-8-65		324	C-150	Basket to FUM.
240-Q	12-9-65		223	C-169	FUM to basket.
240-A	12-9-65		208	C-118	Basket to FUM.
240-R	12-9-65		220	C-110	Basket to FUM.
240-S	12-10-65		324	B-326	FUM to basket.
240-T	12-10-65		206	C-108	Basket to FUM.
240-B	12-10-65		221	C-119	Basket to FUM.
240-N	12-11-65		224	C-162	Basket to FUM.

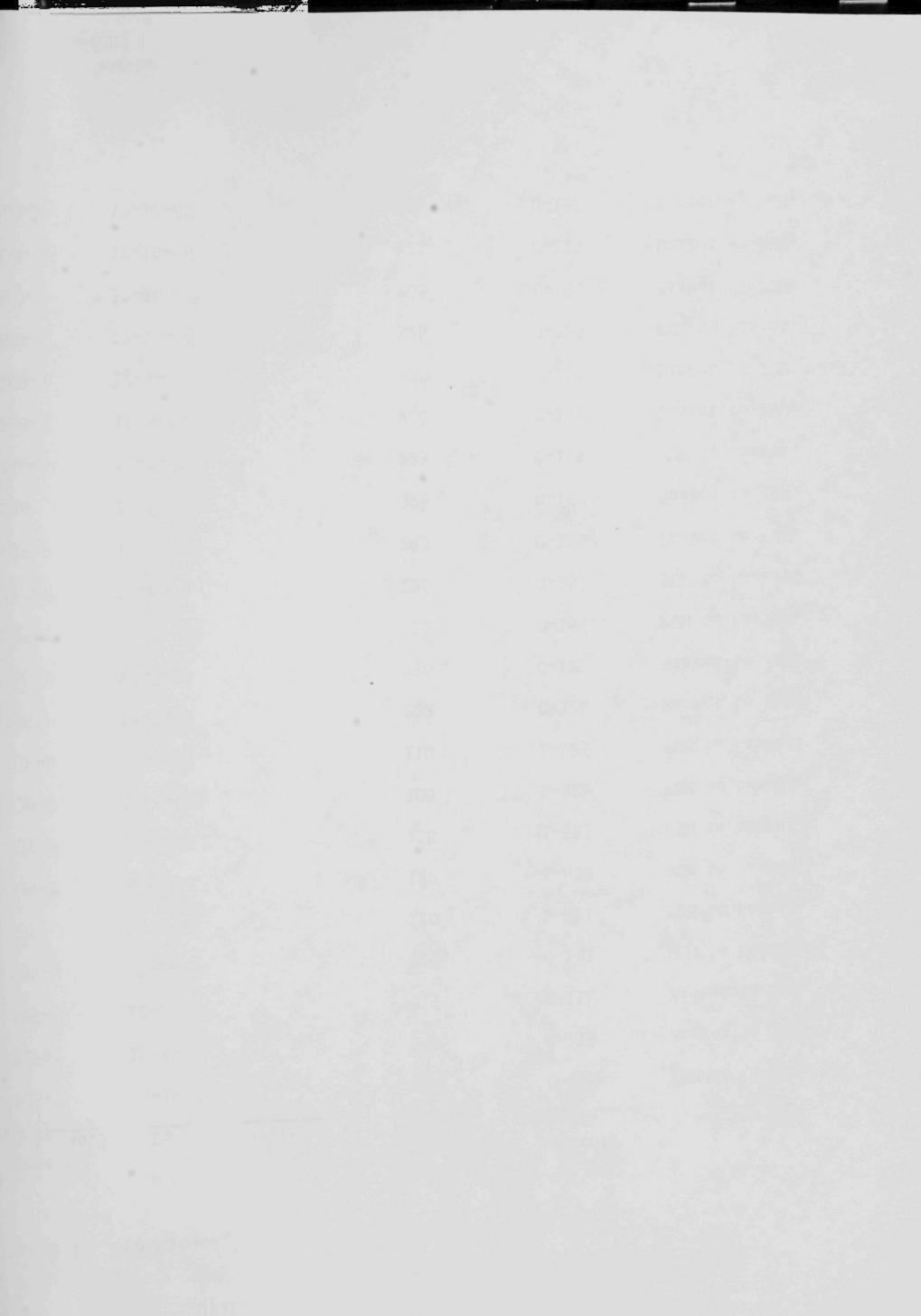


Table II (continued.)

240-C	12-11-65		227	C-120	Basket to FUM.
241	12-11-65		208	XAO8	FUM to basket.
241-A	12-13-65	4-F-2	220	C-132	Grid to basket.
		4-F-2	208	XAO8	Basket to grid.
		4-A-1	208	C-102	Grid to basket.
(Changes for Run #13)		4-A-1	330	C-155	Basket to grid.
		5-B-4	330	C-135	Grid to Basket.
		5-B-4	215	C-161	Basket to grid.
		5-C-1	130	L-107	Grid to basket.
		5-C-1	120	L-121	Basket to grid.
		5-C-3	120	L-115	Grid to basket.
		5-C-3	122	L-122	Basket to grid.
		5-D-1	122	L-405	Grid to basket.
		5-D-1	128	L-423	Basket to grid.
		5-E-1	128	L-403	Grid to basket.
		5-E-1	108	L-424	Basket to grid.
		5-F-1	108	L-401	Grid to basket.
		5-F-1	110	L-425	Basket to grid.
241-D	12-13-65	6-A-2	224	A-747	Grid to basket.
		6-A-2	207	B-318	Basket to grid.
(Changes for Run #13)		6-C-5	207	A-774	Grid to basket.
		6-C-5	324	B-326	Basket to grid.
240-D	12-14-65		328	C-129	Basket to FUM.
240-U	12-15-65		328	B-324	FUM to basket.
240-E	12-15-65		201	C-133	Basket to FUM.
240-F	12-15-65		314	C-116	Basket to FUM.
240-G	12-16-65		316	C-101	Basket to FUM.
241-B (Run #13)	12-16-65	3-F-2	215	C-168	Grid to basket.
		3-F-2	226	C-166	Basket to grid.
241-C (Run #13)	12-16-65	4-B-3	226	C-152	Grid to basket.
		4-B-3	212	C-165	Basket to grid.
240-W	12-17-65		316	B-329	FUM to basket.
240-H	12-17-65		303	C-106	Basket to FUM.
240-X	12-18-65		303	B-328	FUM to basket.
240-K	12-18-65		306	C-127	Basket to FUM.
240-L	12-20-65		313	C-134	Basket to FUM.

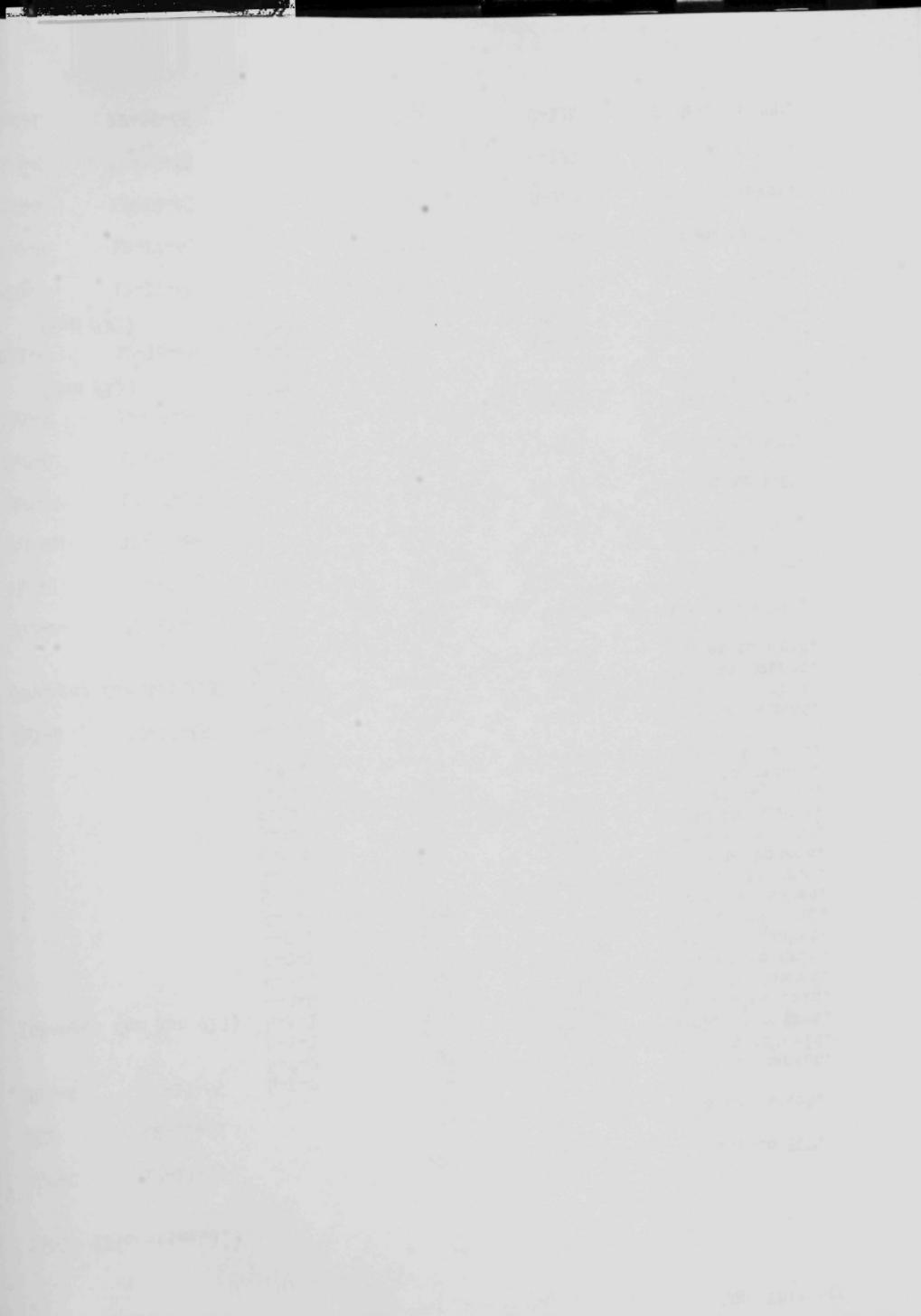


Table II. (continued.)

245-L	12-21-65	306	B-325	FUM to basket.
240-M	12-21-65	216	C-121	Basket to FUM.
245-M	12-21-65	201	B-322	FUM to basket.
245-N	12-22-65	216	B-327	FUM to sket.
235-D	12-22-65	104	L-411	Basket to FUM.
240-Y	12-22-65	213	B-317	FUM to sket.
240-Z	12-22-65	214	B-323	FUM to sket.
245-P	12-23-65	110	L-426	FUM to basket.
245-	12-23-65	108	L-401	Basket to FUM.
242	12-25-65	8-A-1	U-1293	Grid to up.
		8-A-1	U-1293	Down to grid.
		9-B-1	U-1175	Grid to up.
(Outer Blanket check)		9-B-1	U-1175	Down to rid.
		10-C-1	U-1462	Grid to up.
		10-C-1	U-1175	Down to rid.
		11-D-1	U-1486	Grid to up.
		11-D-1	U-1486	Down to grid.
		12-E-2	U-1199	Grid to up.
		12-E-2	U-1199	Down to grid.
		13-F-1	U-1222	Grid to up.
		13-F-1	U-1222	Down to grid.
		14-A-1	U-1289	Grid to up.
		14-A-1	U-1289	Down to rid.
		15-B-3	U-1220	Grid to up.
		15-B-3	U-1220	Down to rid.
		16-C-7	U-115	Grid to up.
		16-C-7	U-115	Down to rid.
244	12-26-65	5-B-4	C-161	Grid to basket.
		5-B-2	C-222X	Grid to transfer point.
		5-B-4	C-222X	Transfer point to grid.
(Changes for Run #14)		5-B-2	C-161	Basket to grid.
		2-D-1	C-158	Grid to basket.
		2-D-1	C-168	Basket to Grid.
		6-A-4	R-305	Grid to basket.
		6-A-4	B-317	Basket to grid.
		6-B-3	B-311	Grid to basket.
		6-B-3	B-323	Basket to grid.

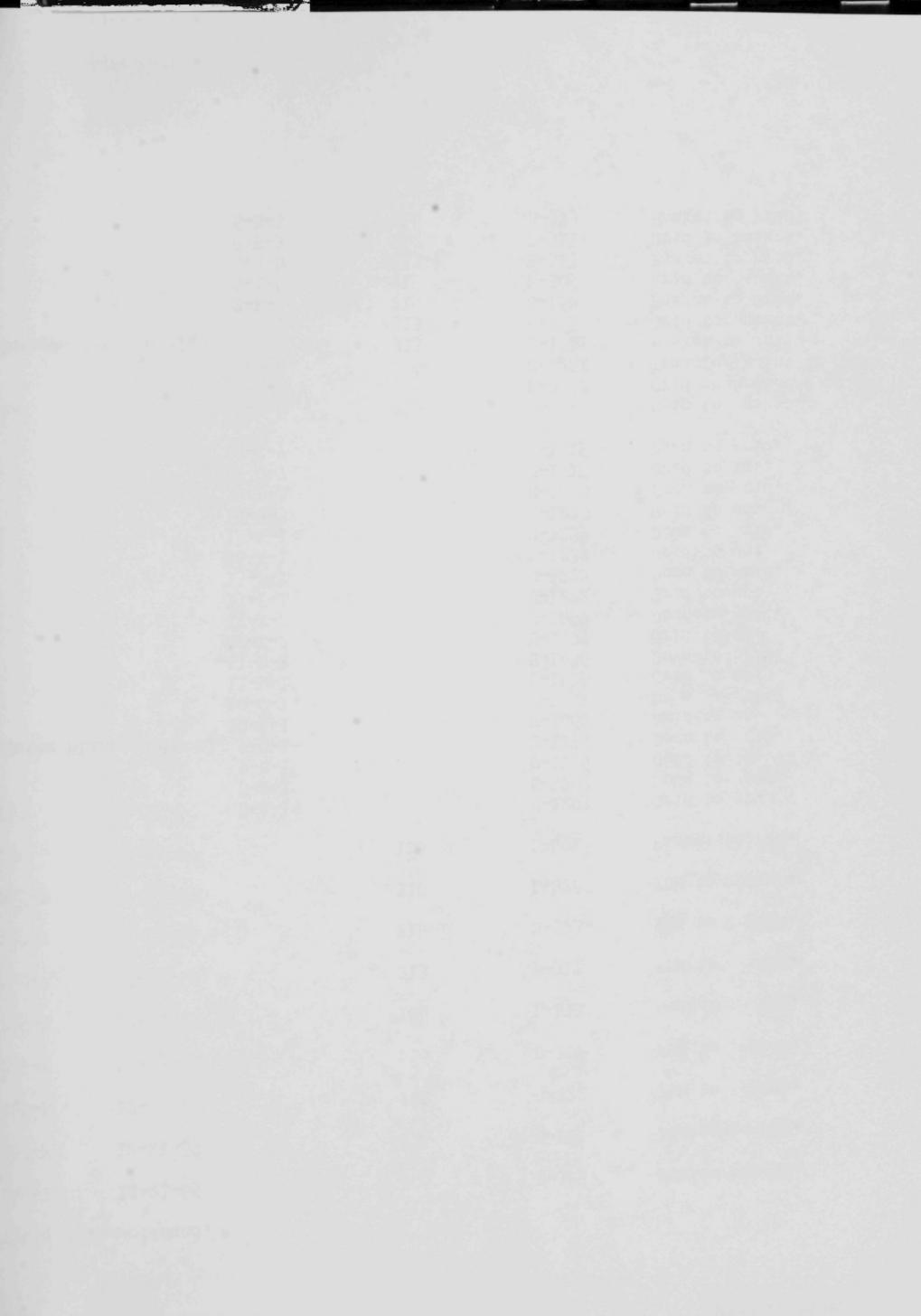


Table II. (continued.)

2lh	12-26-65	6-B-4 6-B-4 6-C-3 6-C-3 6-D-4 6-D-4 6-E-3 6-F-3 6-F-3 6-F-4 6-F-4 5-A-1 5-A-1 6-B-2 6-E-2	227 328 328 303 303 316 316 201 201 216 102 110 221 209	R-300 P-324 B-316 B-328 R-301 B-329 B-313 B-322 B-302 B-327 L-4114 L-4126 A-711 A-729	Grid to basket. Basket to Grid. Grid to basket. Basket to Grid. Grid to basket. Basket to Grid. Grid to basket. Basket to Grid. Basket to Grid. Basket to Grid. Grid to basket. Basket to Grid. Grid to basket. Basket to Grid.
Test 11	12-27-65		329 329	E-64 E-64	FUM to basket. Basket to FUM.

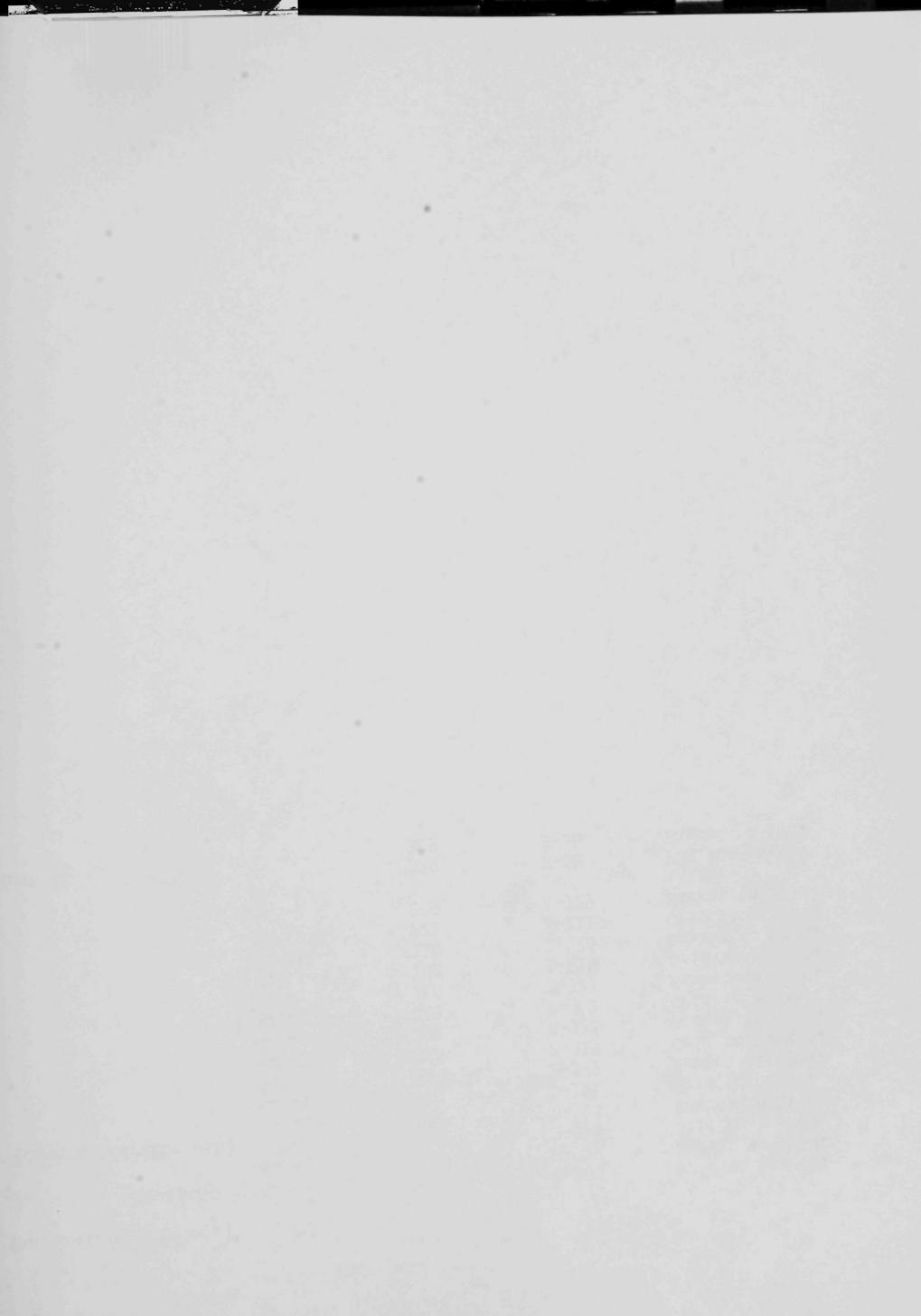


TABLE III  
 EBR-II SCRAM SUMMARY  
 October 1 to December 31, 1969

SCRAM NO.	MONTH	DAY	TIME	OPER. MODE	POWER LEVEL	PARAMETER	CAUSE
213	10	12	1828	R.O.	500 kW	Earthquake Annun.	Blown Fuse
214	10	13	0320	R.O.	20 MW	Outlet Plen. Hi Press	Noise
215	10	13	0637	R.O.	22.5 MW	Any CR unlatched	Unknown-Prob. Low Flow Scram
216	10	13	1056	R.O.	500 kW	Inlet #2 Low flow	Defective Relay
217	10	13	1840	R.O.	10 MW	Bulk Na Low Level	Spurious
218	10	23	1305	F.H.	Sub Crit	Manual	Fuel Handling Complete
219	10	29	1130	R.O.	0	Electrical Supply	Constant Power Switchover
220	10	31	0317	R.O.	45 MW	Manual	Lost FW Flow-Starting TDFWP.
221	11	1	1235	R.O.	45 MW	Manual	Ferd Loop Alarm
222	11	4	0155	R.O.	45 MW	Inlet #2 Low flow	Spurious
223	11	4	0315	R.O.	Sub Crit	Any CR unlatched	Scram Assist Air Press Low
224	11	4	0425	R.O.	Sub Crit	Any CR unlatched	Scram Assist Air Press Low
225	11	20	0914	R.O.	20 MW	Bulk Na Low Level	Compensator Temp. Reading Bad
226	11	26	0550	R.O.	45 MW	Flow rate of Change	Spurious
227	11	28	0530	F.H.	Sub Crit	Ch #1 Period	Tech. Checking Instr.
228	11	28	0750	F.H.	Sub Crit	Ch #1 Level low	Tech. Checking Instr.
229	11	28	1650	F.H.	Sub Crit	Ch #1 & 2	Tech. Checking Instr.
230	12	4	1015	R.O.	45 MW	Inlet #2 Low flow	Damaged wire in Recorder
231	12	5	2035	R.O.	42 MW	Manual	Lost G.S. Steam-Aux. Boiler Off
232	12	9	2000	R.O.	5 MW	Bulk Na Lo Level	Bad Tube in Instr.
233	12	10	0830	R.O.	45 MW	Flow rate of Change	Noise
234	12	14	1925	R.O.	10 MW	Bulk Na Lo Level	Instr. Anomaly
235	12	15	0215	R.O.	45 MW	React. Out Low Flow	Improper Set Flux Flow Meter
236	12	15	0540	R.O.	0.5 MW	Bulk Na High Level	Instr. Anomaly
237	12	21	0831	R.O.	45 MW	Manual	Ferd Loop Alarm
238	12	21	1107	R.O.	18 MW	Manual	Ferd Loop Alarm
239	12	23	1030	R.O.	0	Manual (After Fast Shutdown)	Constant Process Power Failure



TABLE IV

## OPERATING HISTORY DATA

October 1965

Reactor Critical Time	Cumulative Critical Time	Gross Thermal Energy	Cumulative Gross Thermal Energy	Gross Electrical Energy	Cumulative Electrical Energy	Generator On Time	Cumulative Generator On Time	Thermal Power Max.	Rar. Min.
Day	HRS	HRS	MWht	MWht	MWhe	HRS	HRS	MW	MW
1	0	3055.4	0	79734	0	22547	0	1853.5	0
2	0	3055.4	0	79734	0	22547	0	1853.5	0
3	0	3055.4	0	79734	0	22547	0	1853.5	0
4	0	3055.4	0	79734	0	22547	0	1853.5	0
5	0	3055.4	0	79734	0	22547	0	1853.5	0
6	0	3055.4	0	79734	0	22547	0	1853.5	0
7	0	3055.4	0	79734	0	22547	0	1853.5	0
8	0	3055.4	0	79734	0	22547	0	1853.5	0
9	0	3055.4	0	79734	0	22547	0	1853.5	0
10	0	3055.4	0	79734	0	22547	0	1853.5	0
11	0	3055.4	0	79734	0	22547	0	1853.5	0
12	3.6	3059.0	1	79735	0	22547	0	1853.5	0.5
13	17.4	3076.4	134	79869	5	22552	1	1854.5	25.0
14	24.0	3100.4	1027	80896	333	22885	24	1878.5	45
15	24.0	3124.4	1080	81976	350	23235	24	1902.5	45
16	24.0	3148.4	1080	83056	352	23587	24	1926.5	45
17	24.0	3172.4	1080	84136	351	23938	24	1950.5	45
18	24.0	3196.4	985	85121	332	24270	22	1972.5	45
19	24.0	3220.4	939	86060	278	24548	20	1992.5	45
20	24.0	3244.4	1080	87140	349	24897	24	2016.5	45
21	20.5	3264.9	828	87968	246	25143	18.8	2035.3	45
22	0	3264.9	0	87968	0	25143	0	2035.3	0
23	0	3264.9	0	87968	0	25143	0	2035.3	0
24	0	3264.9	0	87968	0	25143	0	2035.3	0
25	0	3264.9	0	87968	0	25143	0	2035.3	0
26	0	3264.9	0	87968	0	25143	0	2035.3	0
27	0	3264.9	0	87968	0	25143	0	2035.3	0
28	0	3264.9	0	87968	0	25143	0	2035.3	0
29	11.5	3276.4	211	88179	25	25168	1.9	2037.2	45
30	24	3300.4	1080	89259	332	25500	24.0	2061.2	45
31	22.5	3322.9	947	90206	298	25798	21.5	2082.7	45

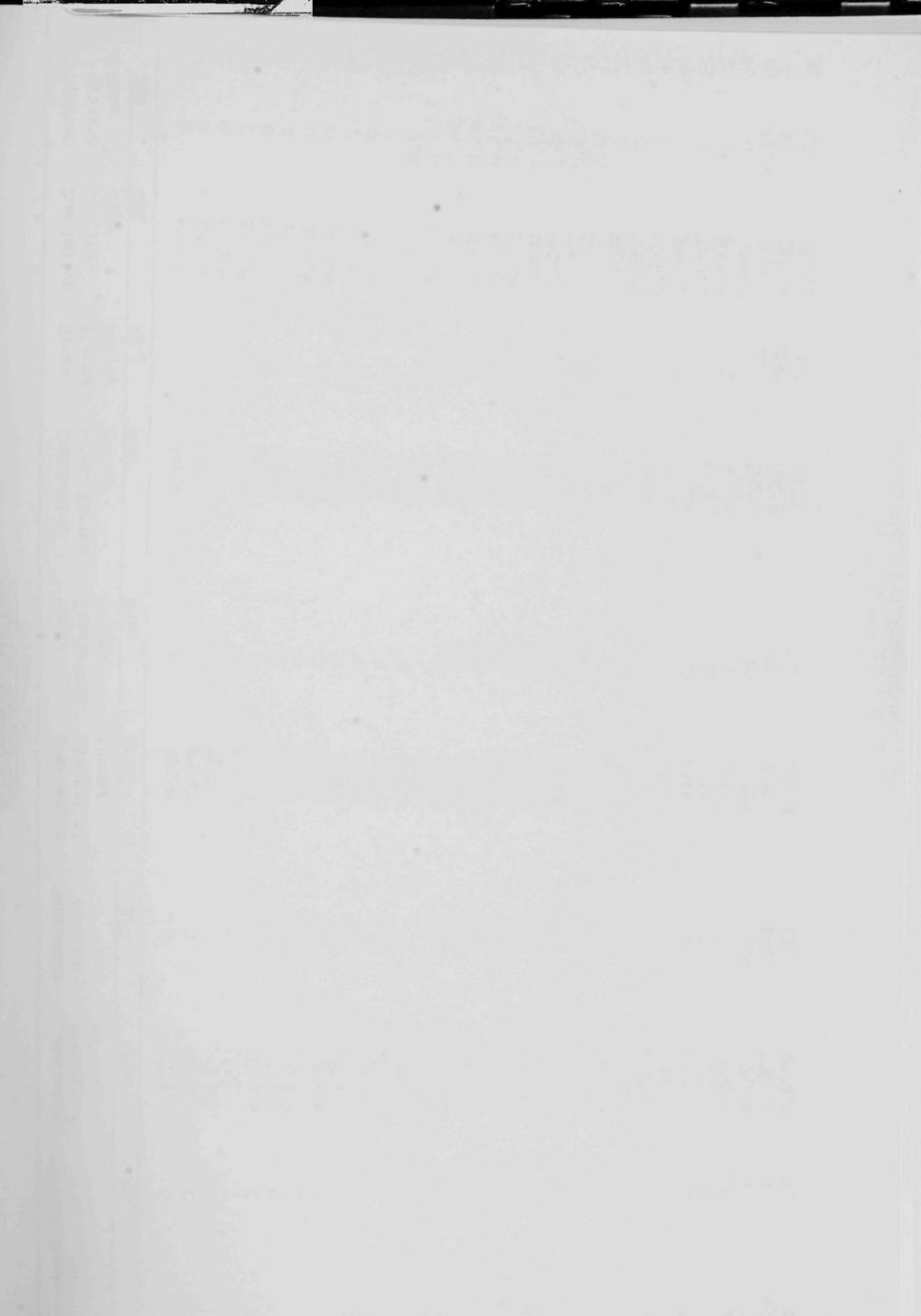


TABLE IV (Cont'd)  
OPERATING HISTORY DATA  
November 1965

DAY	Reactor Critical Time	Cumulative Critical Time	Gross Thermal Energy	Cumulative Gross Thermal Energy	Gross Electrical Energy	Cumulative Electrical Energy	Generator On Time	Cumulative Generator On Time	Thermal Power Max.	Rang Min.
	HRS	HRS	MWht	MWht	MWhe	MWhe	HRS	HRS	MW	MW
1	21.5	3344.4	883	91089	251	26049	19.5	2102.2	45	0
2	24.0	3368.4	1080	92169	319	26368	24.0	2126.2	45	45
3	24.0	3392.4	1080	93249	344	26712	24.0	2150.2	45	45
4	13.9	3406.3	331	93580	64	26776	5.4	2155.6	45	0
5	11.0	3417.3	178	93758	20	26796	1.5	2157.1	45	0
6	24.0	3441.3	1080	94838	352	27148	24.0	2181.1	45	45
7	17.5	3458.8	684	95522	163	27311	16.0	2197.1	45	0
8	0	3458.8	0	95522	0	27311	0	2197.1	0	0
9	0	3458.8	0	95522	0	27311	0	2197.1	0	0
10	0	3458.8	0	95522	0	27311	0	2197.1	0	0
11	0	3458.8	0	95522	0	27311	0	2197.1	0	0
12	0	3458.8	0	95522	0	27311	0	2197.1	0	0
13	0	3458.8	0	95522	0	27311	0	2197.1	0	0
14	0	3458.8	0	95522	0	27311	0	2197.1	0	0
15	0	3458.8	0	95522	0	27311	0	2197.1	0	0
16	0	3458.8	0	95522	0	27311	0	2197.1	0	0
17	0	3458.8	0	95522	0	27311	0	2197.1	0	0
18	0	3458.8	0	95522	0	27311	0	2197.1	0	0
19	22.2	3481.0	37	95559	0	27311	0	2197.1	6	0
20	22.5	3503.5	456	96015	0	27311	0	2197.1	45	0
21	24.0	3527.5	980	96995	0	27311	0	2197.1	41	40
22	24.0	3551.5	1024	98019	100	27411	8.2	2205.3	45	41
23	24.0	3575.5	1080	99099	342	27753	24.0	2229.3	45	45
24	24.0	3599.5	1080	100179	320	28073	24.0	2253.3	45	45
25	24.0	3623.5	1080	101259	340	28413	24.0	2277.3	45	45
26	23.0	3646.5	967	102226	274	28687	21.0	2298.3	45	45
27	13.0	3659.5	505	102731	151	28838	11.7	2310.0	45	0
28	0	3659.5	0	102731	0	28838	0	2310.0	0	0
29	0.3	3659.8	0	102731	0	28838	0	2310.0	0	0
30	24.0	3683.8	819	103550	151	28993	14.8	2324.8	45	0.5

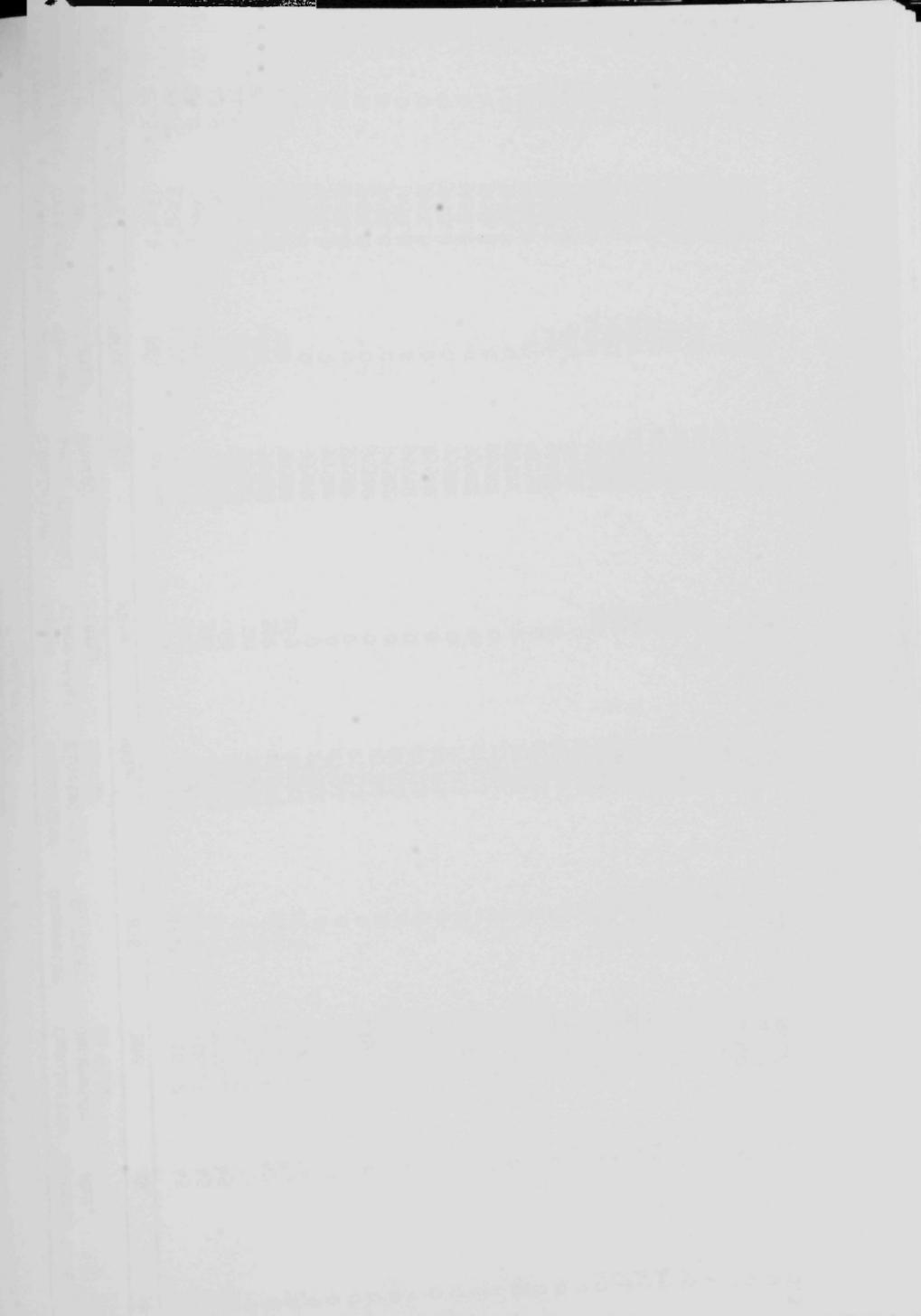


TABLE IV (Cont'd)

OPERATING HISTORY DATA  
December 1965

Reactor Critical Time	Cumulative Critical Time	Gross Thermal Energy	Cumulative Gross Thermal Energy	Gross Electrical Energy	Cumulative Electrical Energy	Generator On Time	Cumulative Generator On Time	Thermal Power Max.	Ra Mi
Day	HRS	HRS	MWht	MWht	MWhe	HRS	HRS	MW	MW
1	24.0	3707.8	1080	104630	323	29316	24.0	2348.8	45 45
2	24.0	3731.8	1080	105710	328	29644	24.0	2372.8	45 45
3	24.0	3755.8	1080	106790	322	29966	24.0	2396.8	45 45
4	22.3	3778.1	943	107733	50	30016	4.4	2401.2	45 0
5	20.3	3798.4	862	108595	0	30016	0	2401.2	45 0
6	23.0	3821.4	937	109532	0	30016	0	2401.2	42 0
7	24.0	3845.4	1032	110564	120	30136	8.5	2409.7	45 42
8	24.0	3869.4	1068	111632	274	30410	21.5	2431.2	45 42
9	22.5	3891.9	749	112381	209	30619	16.1	2447.3	45 50 kW
10	22.5	3914.4	870	113251	241	30860	19.8	2467.1	45 0
11	23.5	3937.9	759	114010	220	31080	18.3	2485.4	45 0
12	0	3937.9	0	114010	0	31080	0	2485.4	0 0
13	0	3937.9	0	114010	0	31080	0	2485.4	0 0
14	13.5	3951.4	52	114062	0	31080	0	2485.4	30 0
15	11.6	3963.0	294	114356	0	31080	0	2485.4	40 0
16	2.0	3965.0	0	114356	0	31080	0	2485.4	0.5 0
17	19.4	3984.4	285	114641	9	31089	2	2487.4	45 0
18	24.0	4008.4	1080	115721	324	31413	24	2511.4	45 45
19	24.0	4032.4	1080	116801	324	31737	24	2535.4	45 45
20	24.0	4056.4	1080	117881	323	32060	24	2559.4	45 45
21	22.6	4079.0	862	118743	246	32306	19	2578.4	45 0
22	24.0	4103.0	1080	119823	314^	32620	24	2602.4	45 45
23	21.0	4124.0	884	120707	240	32860	18.8	2621.2	45 0
24	12.5	4136.5	493.8	121201	152	33012	11	2632.2	45 0
25	0	4136.5	0	121201	0	33012	0	2632.2	0 0
26	0	4136.5	0	121201	0	33012	0	2632.2	0 0
27	0	4136.5	0	121201	0	33012	0	2632.2	0 0
28	0	4136.5	0	121201	0	33012	0	2632.2	0 0
29	0	4136.5	0	121201	0	33012	0	2632.2	0 0
30	0	4136.5	0	121201	0	33012	0	2632.2	0 0
31	0	4136.5	0	121201	0	33012	0	2632.2	0 0

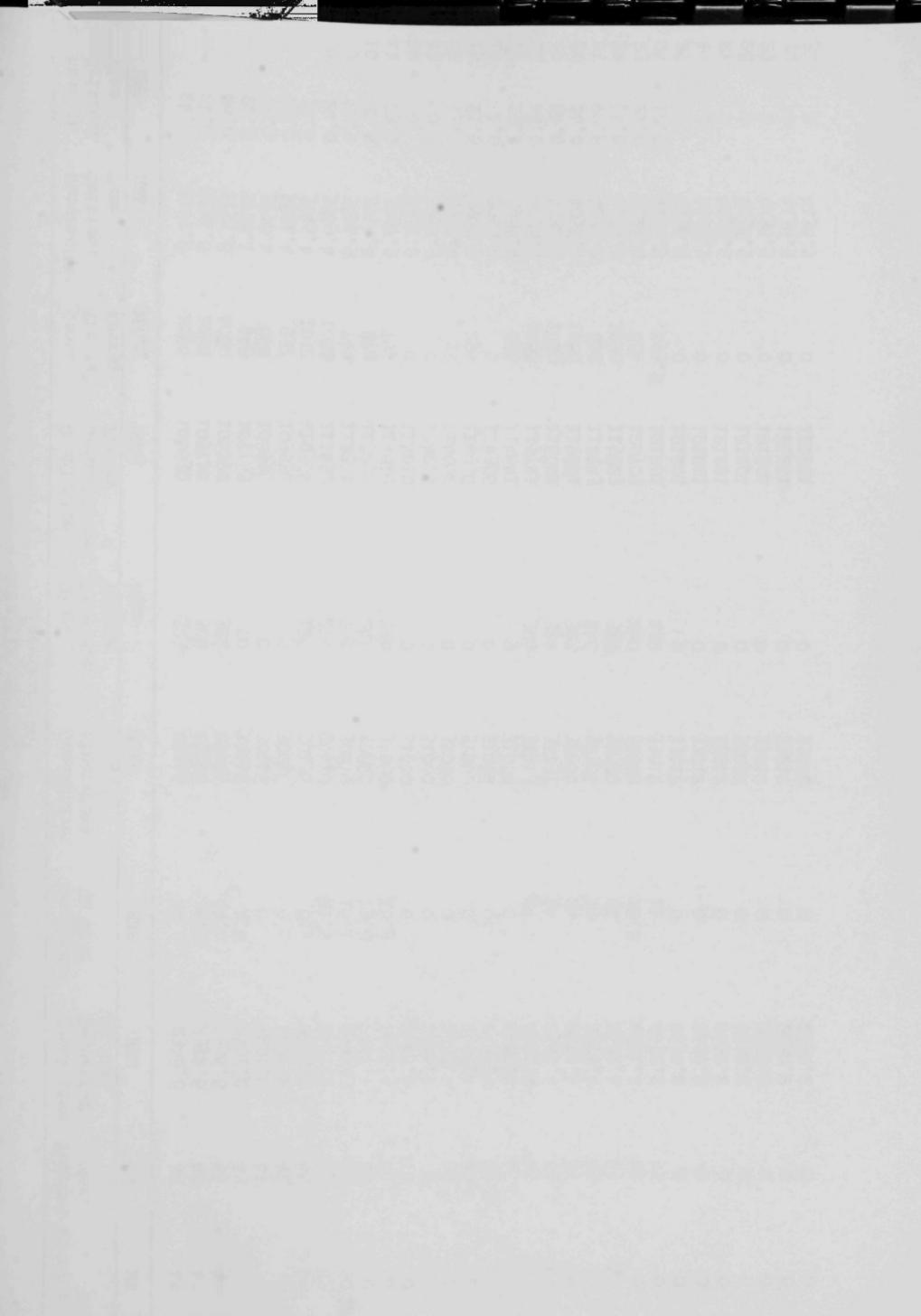
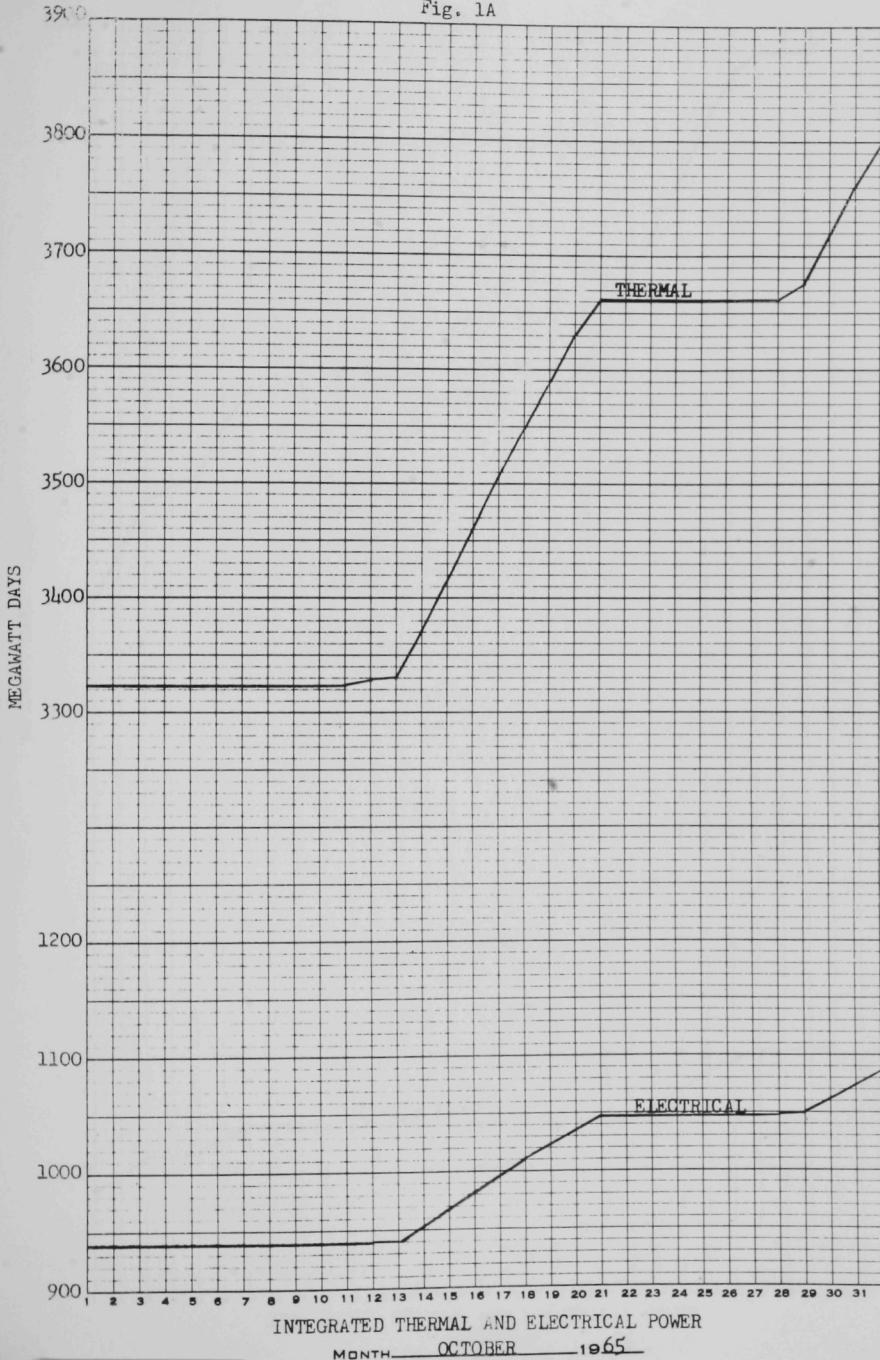


Fig. 1A



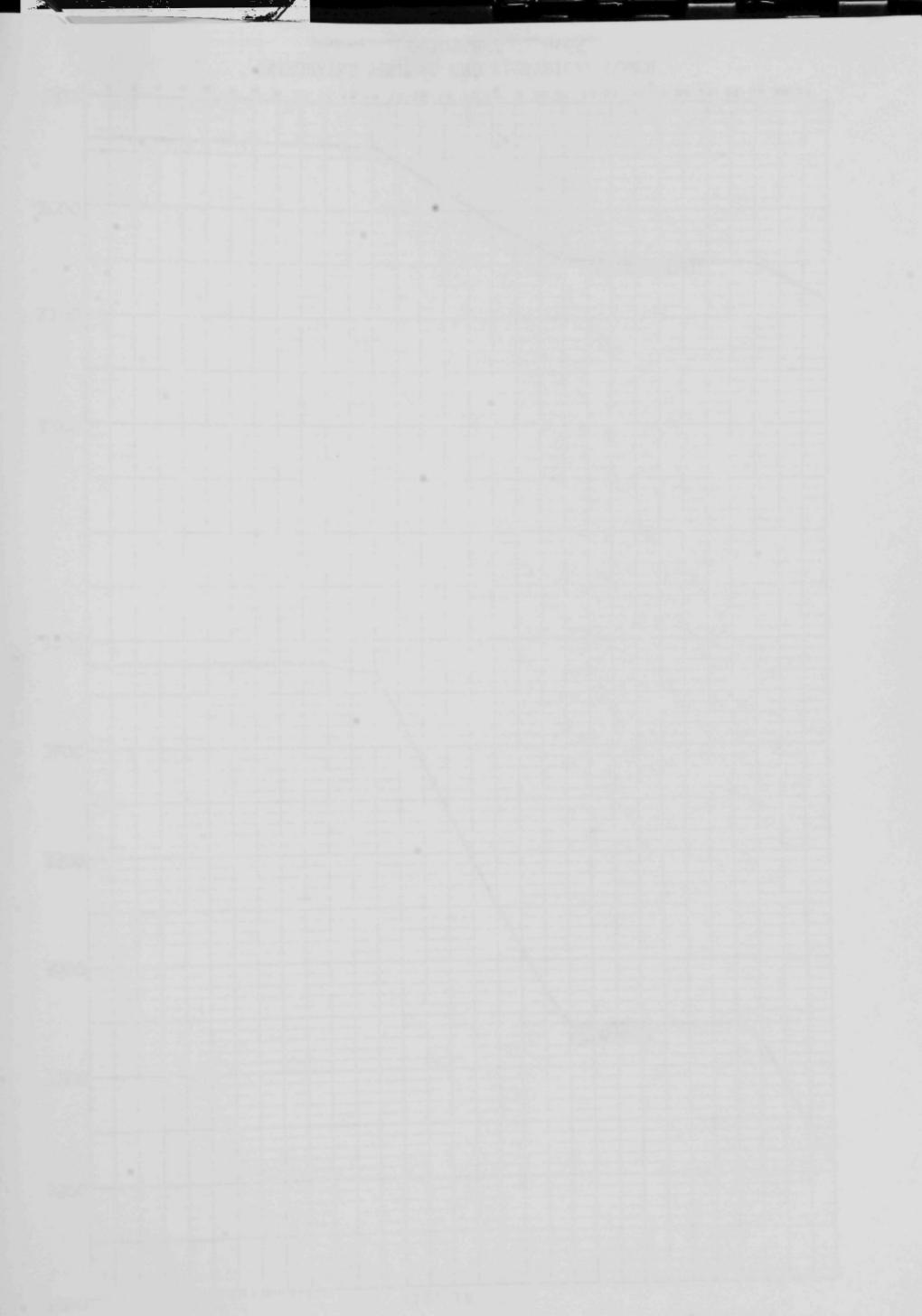
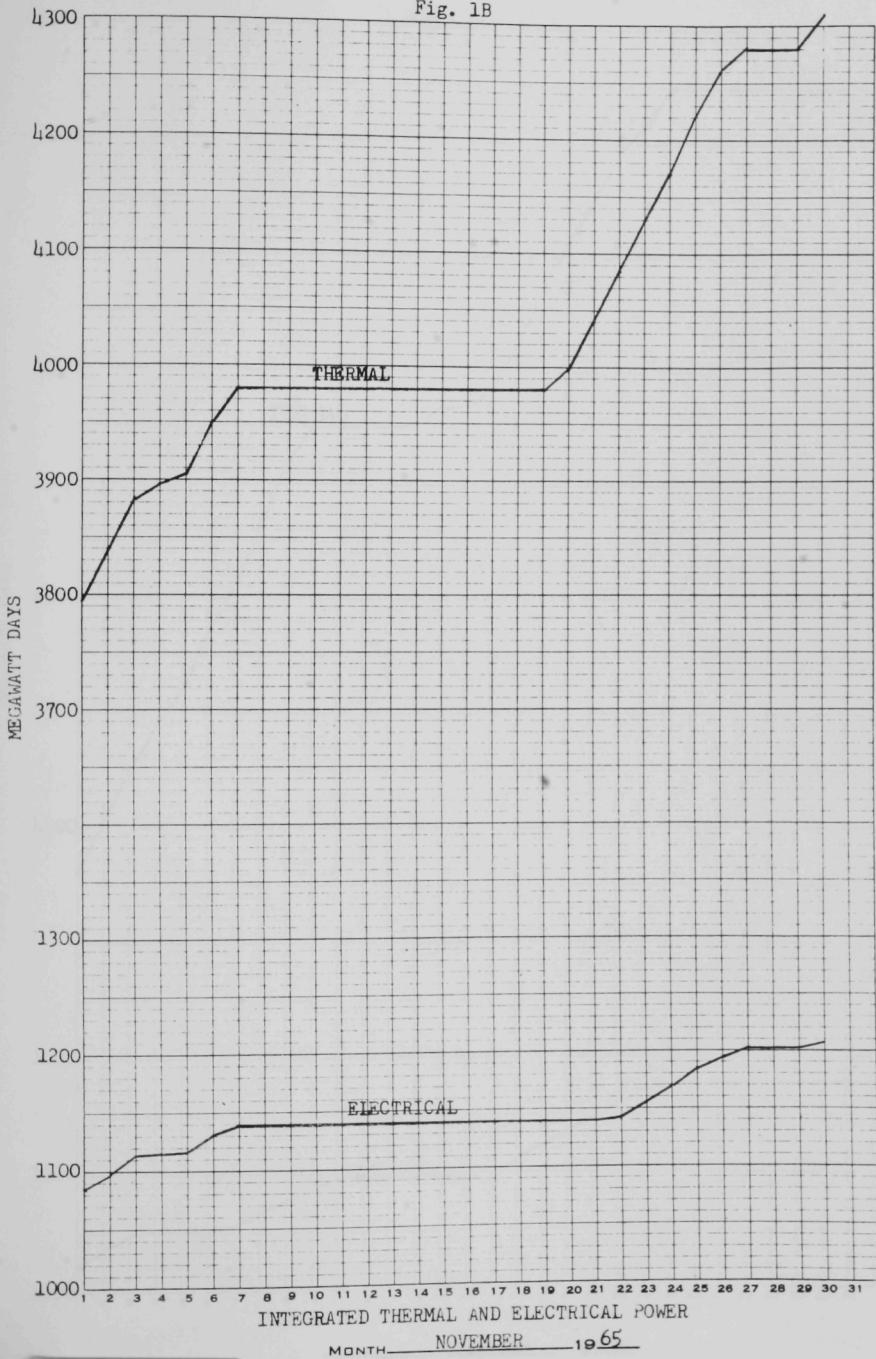


Fig. 1B



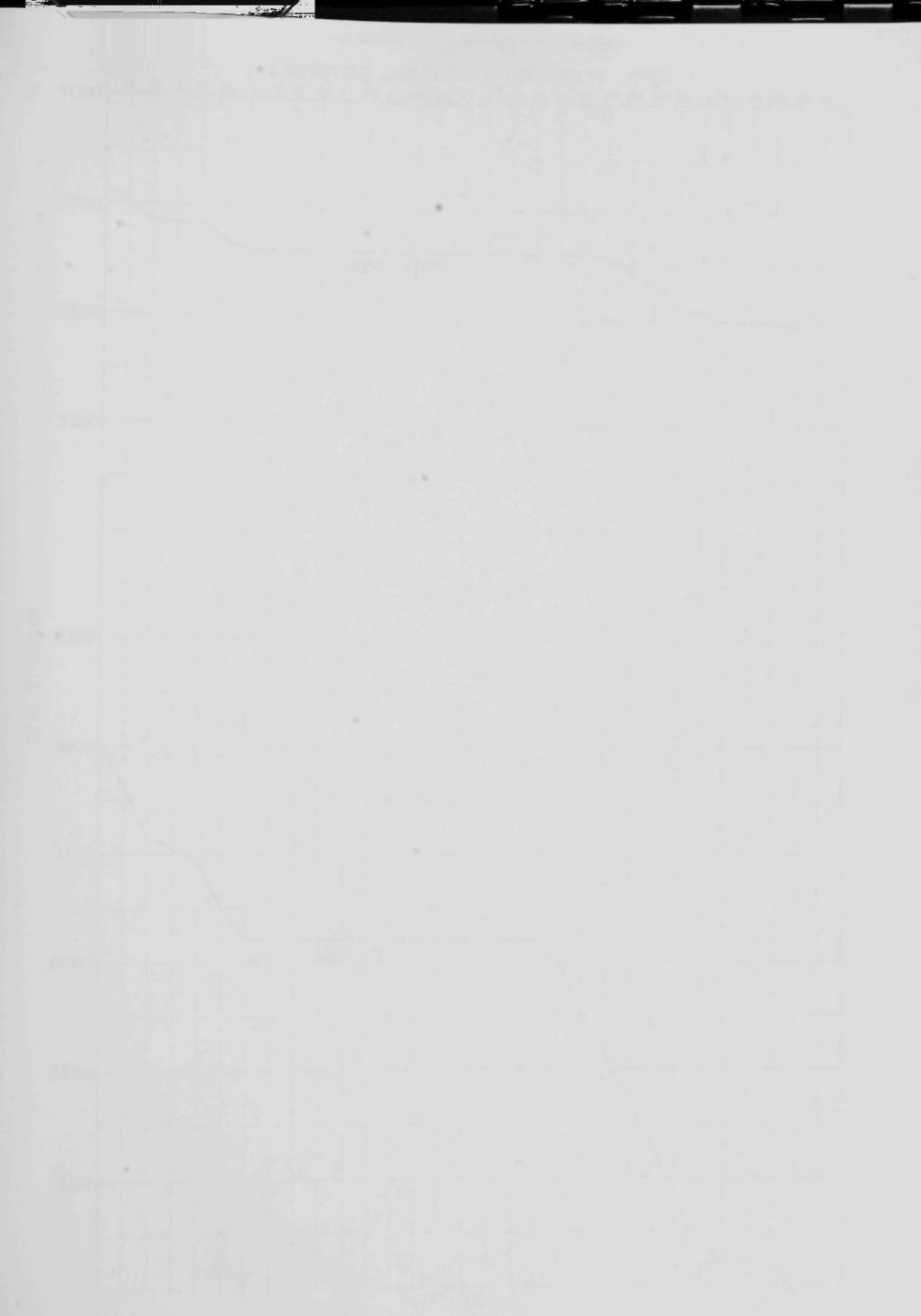
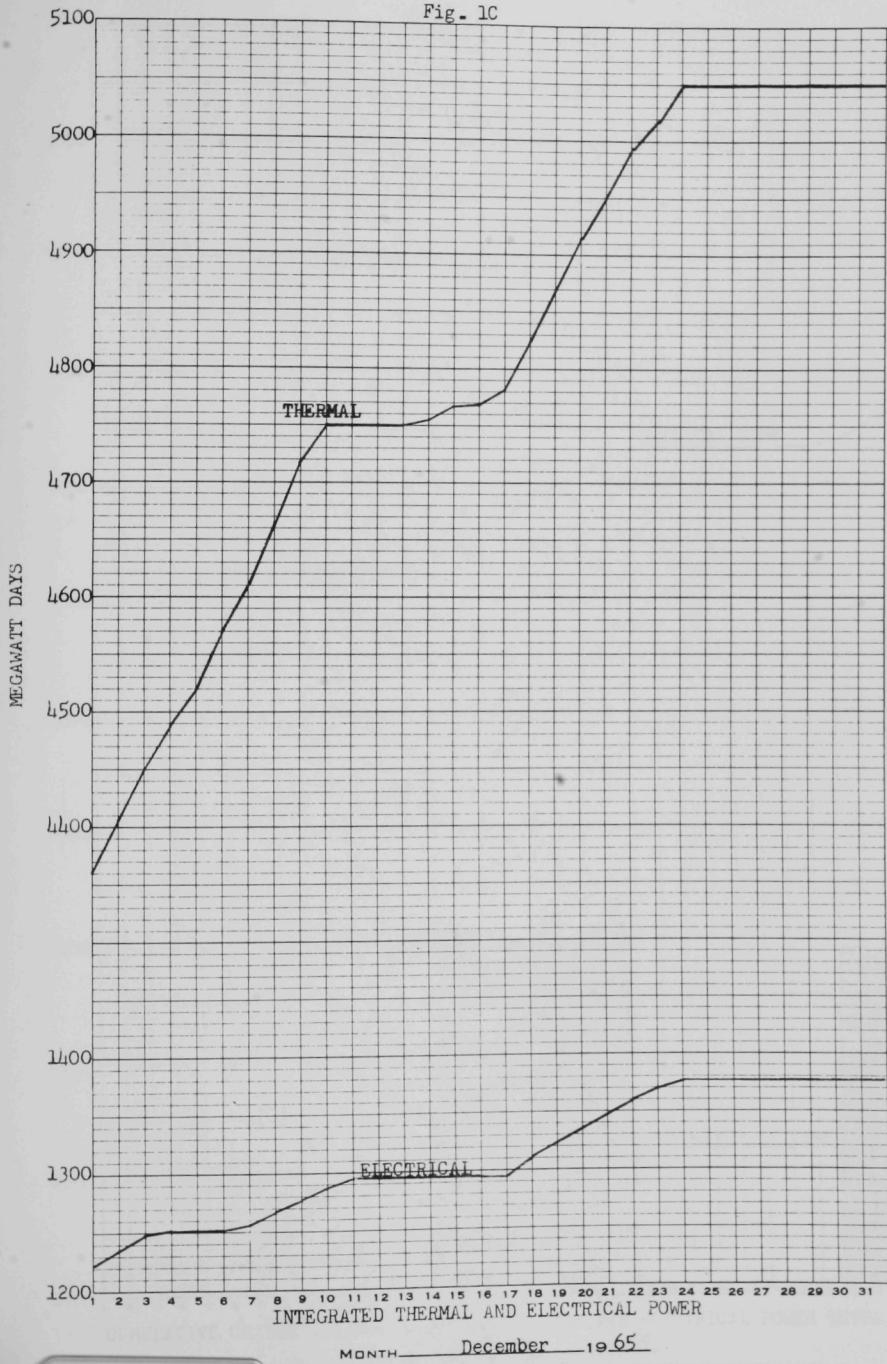


Fig. 1C



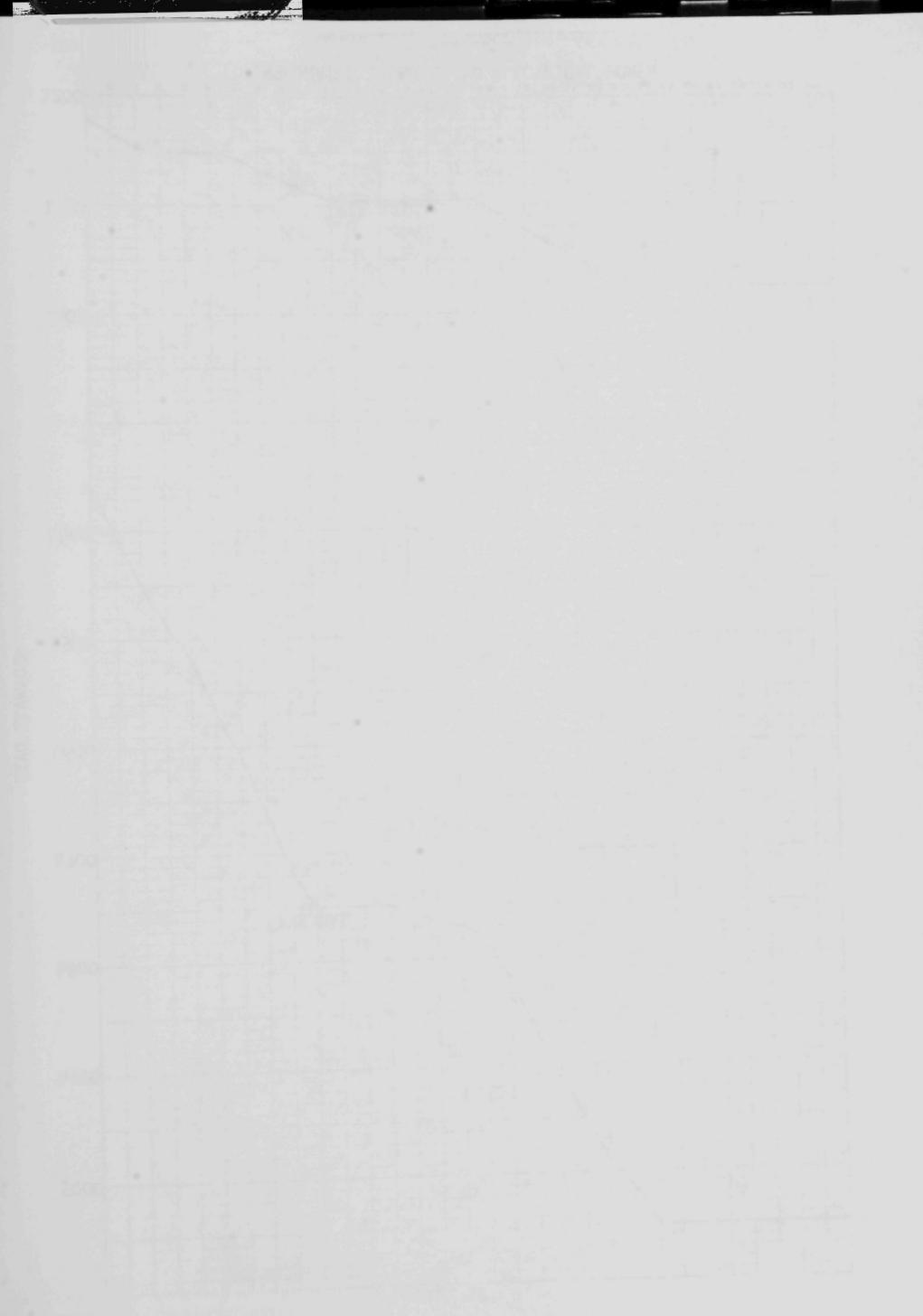
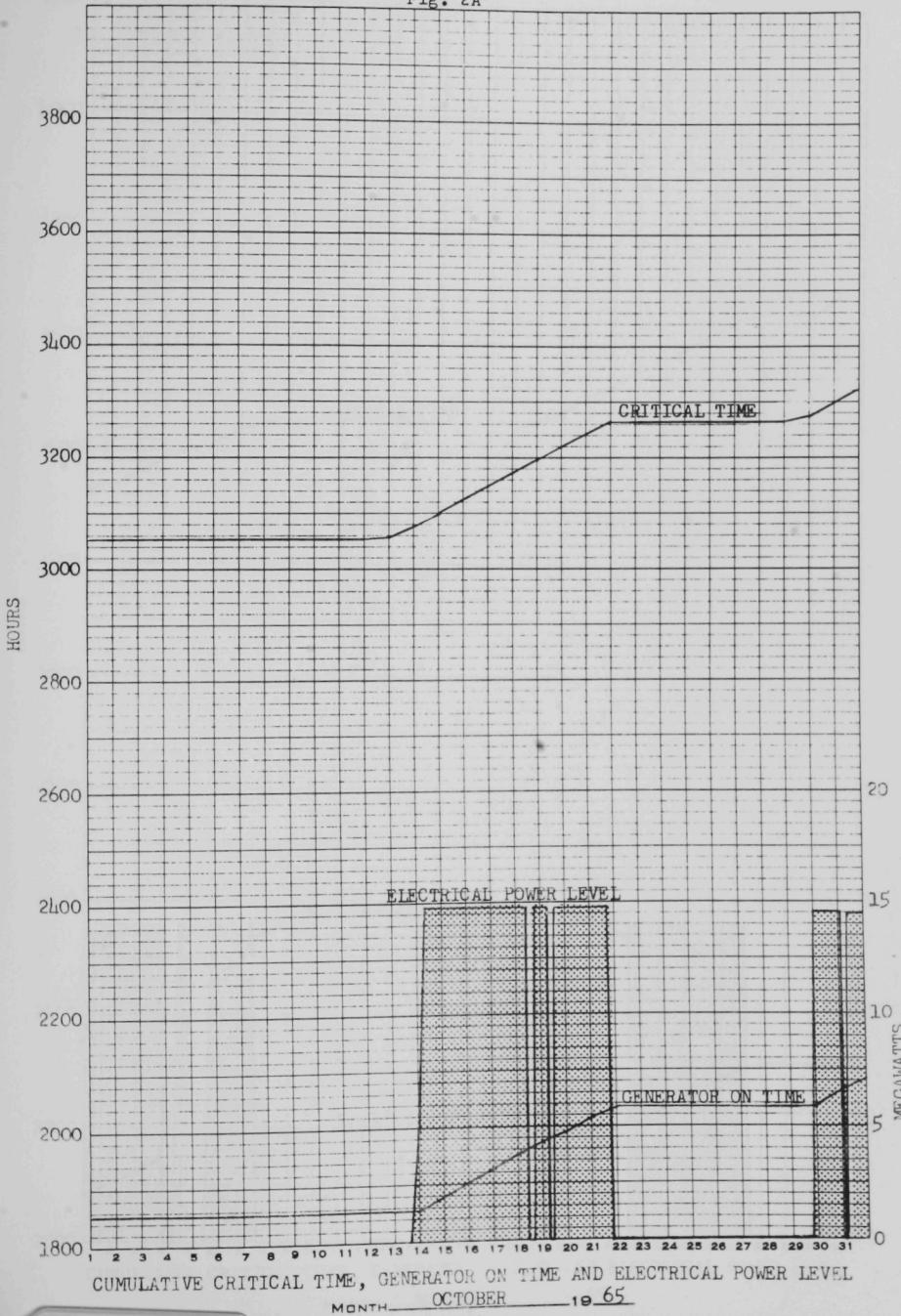
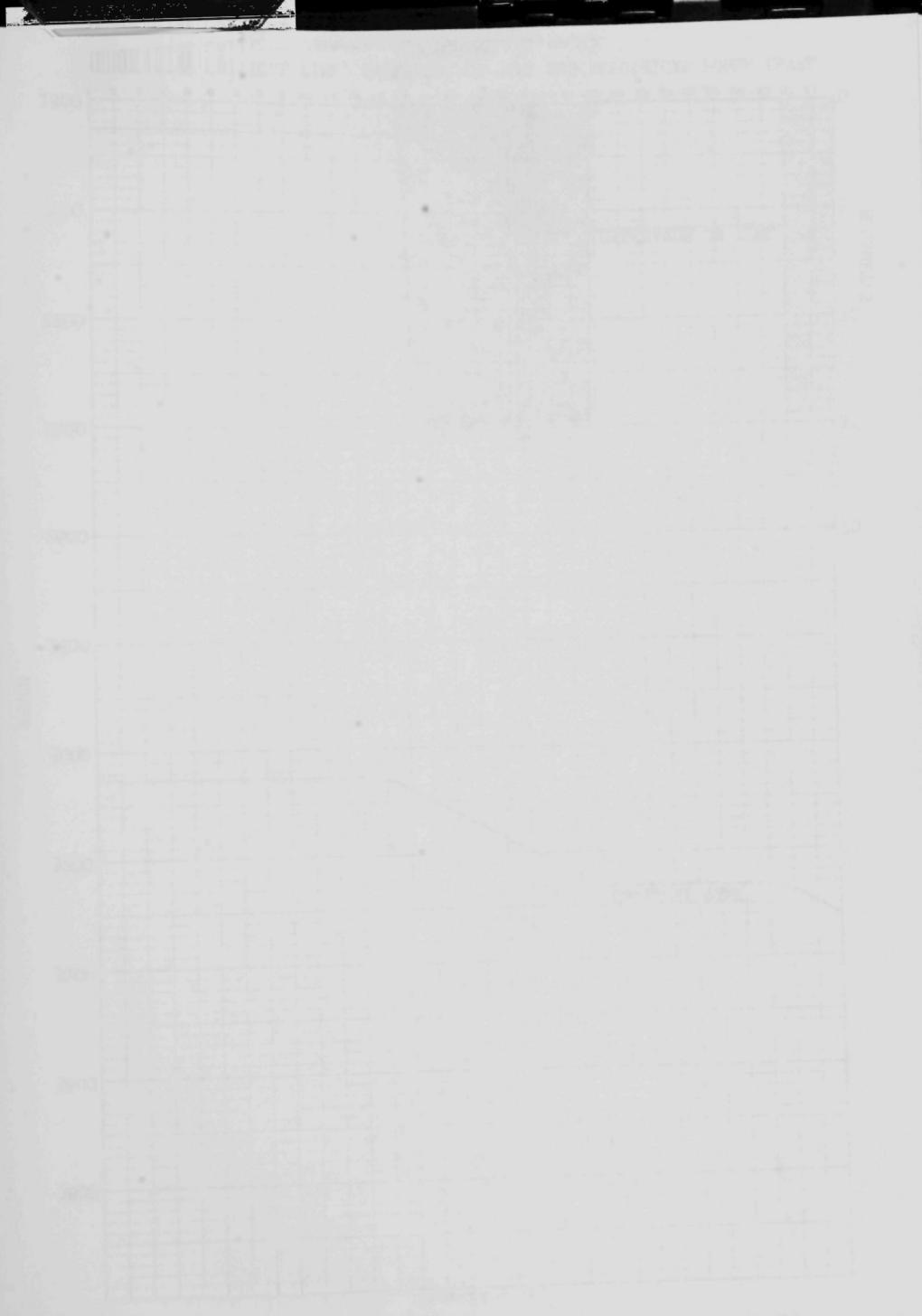


Fig. 2A





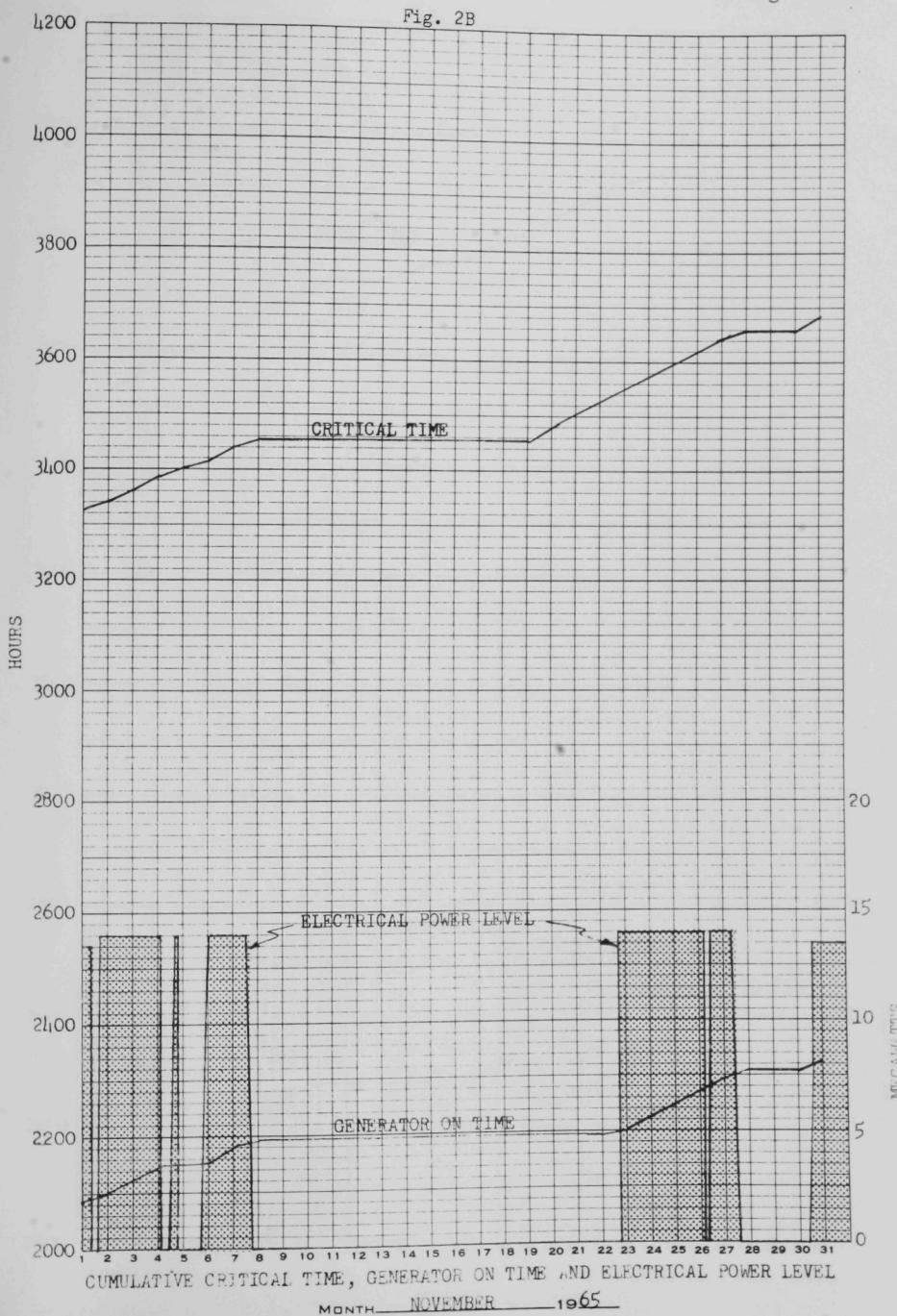




Fig. 2C

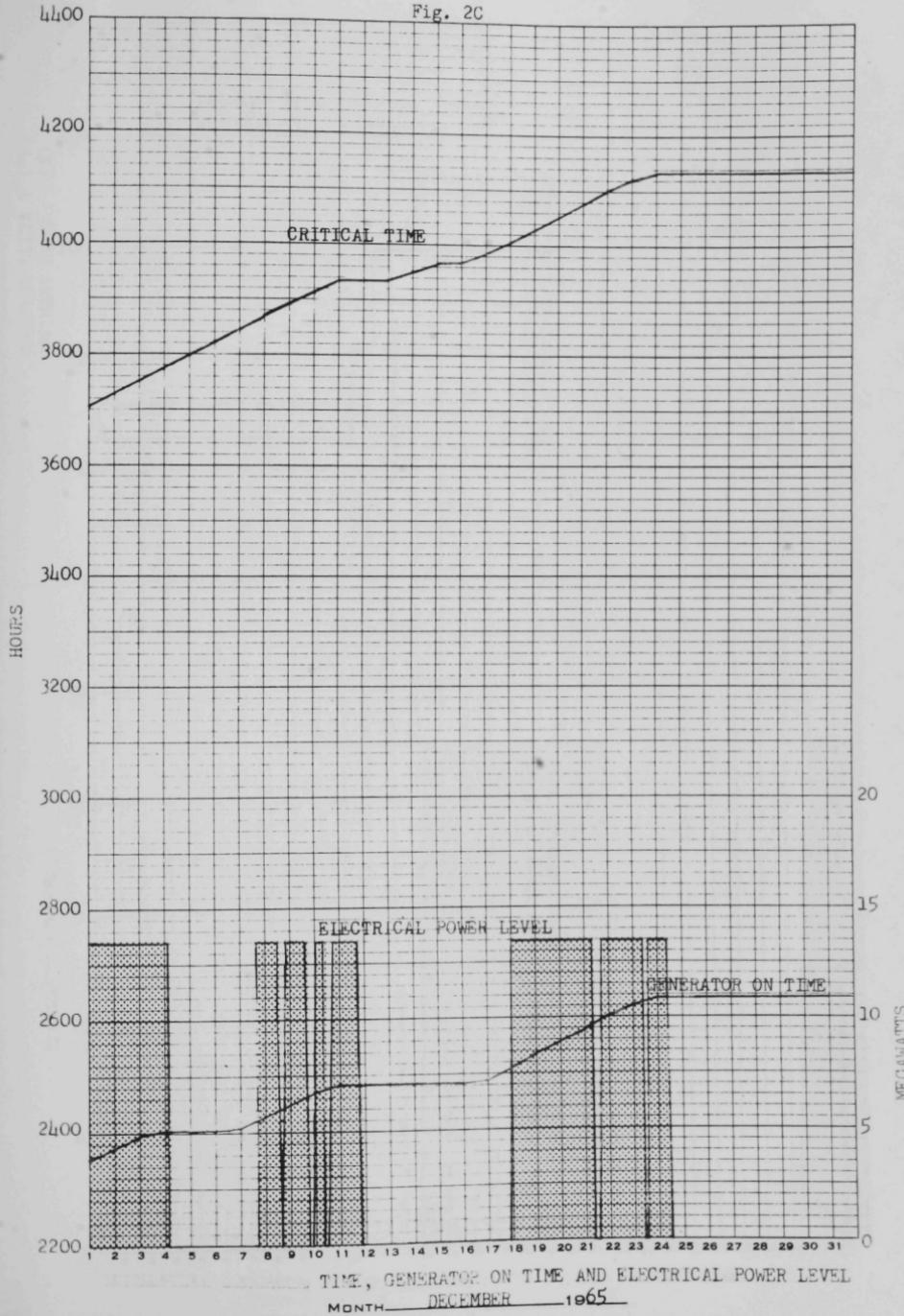




Fig. 3a

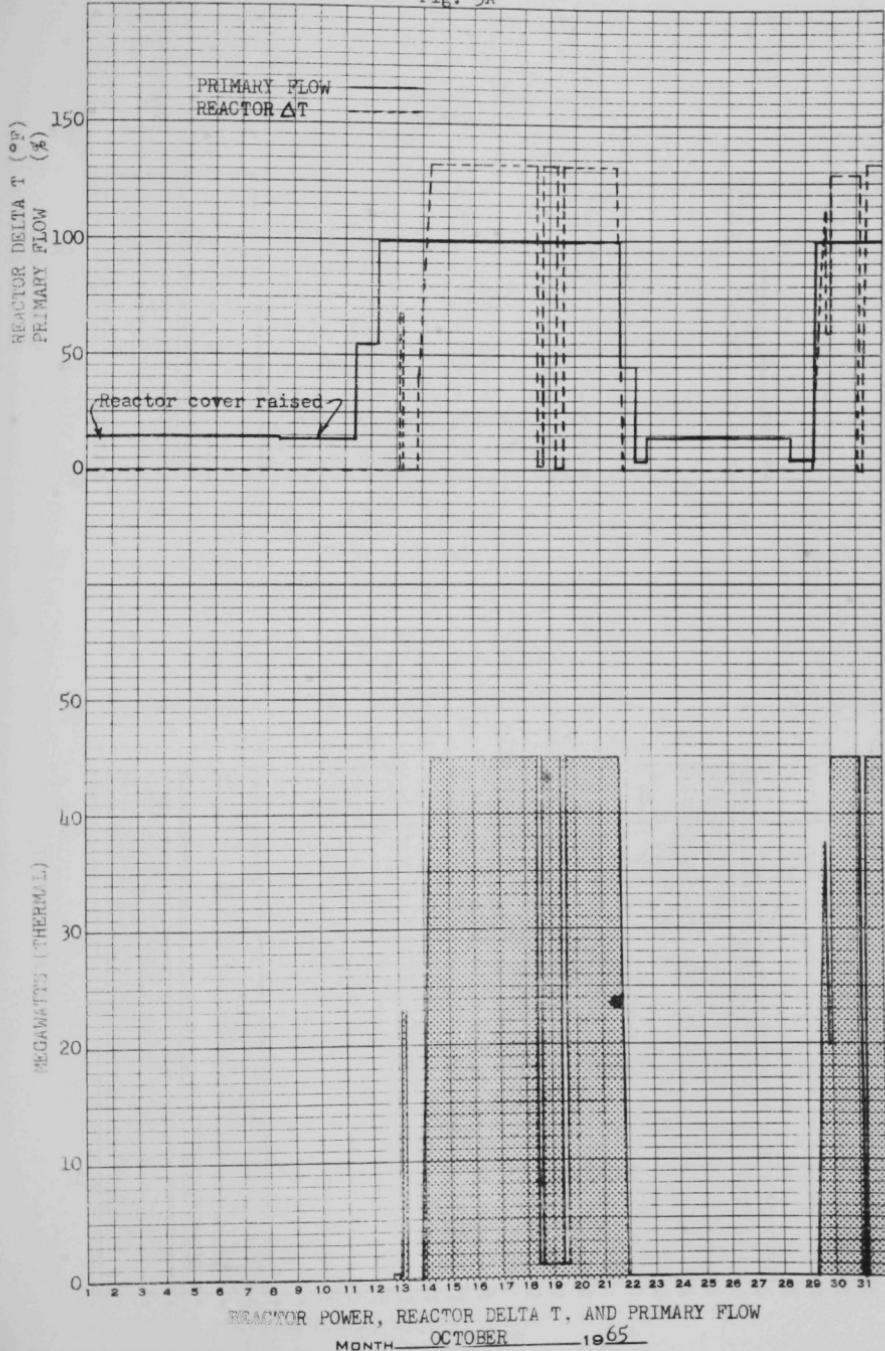




Fig. 3B

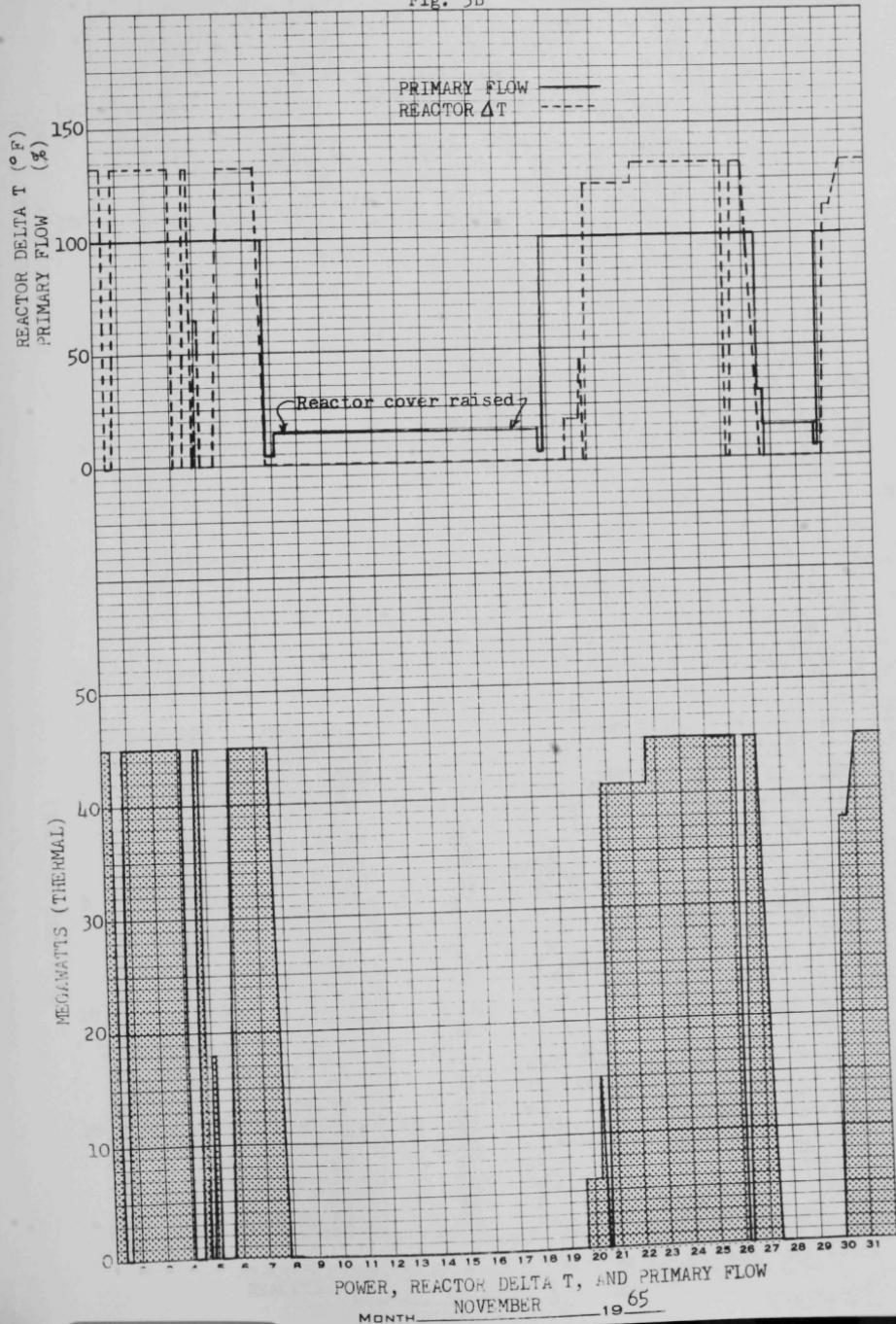




Fig. 30

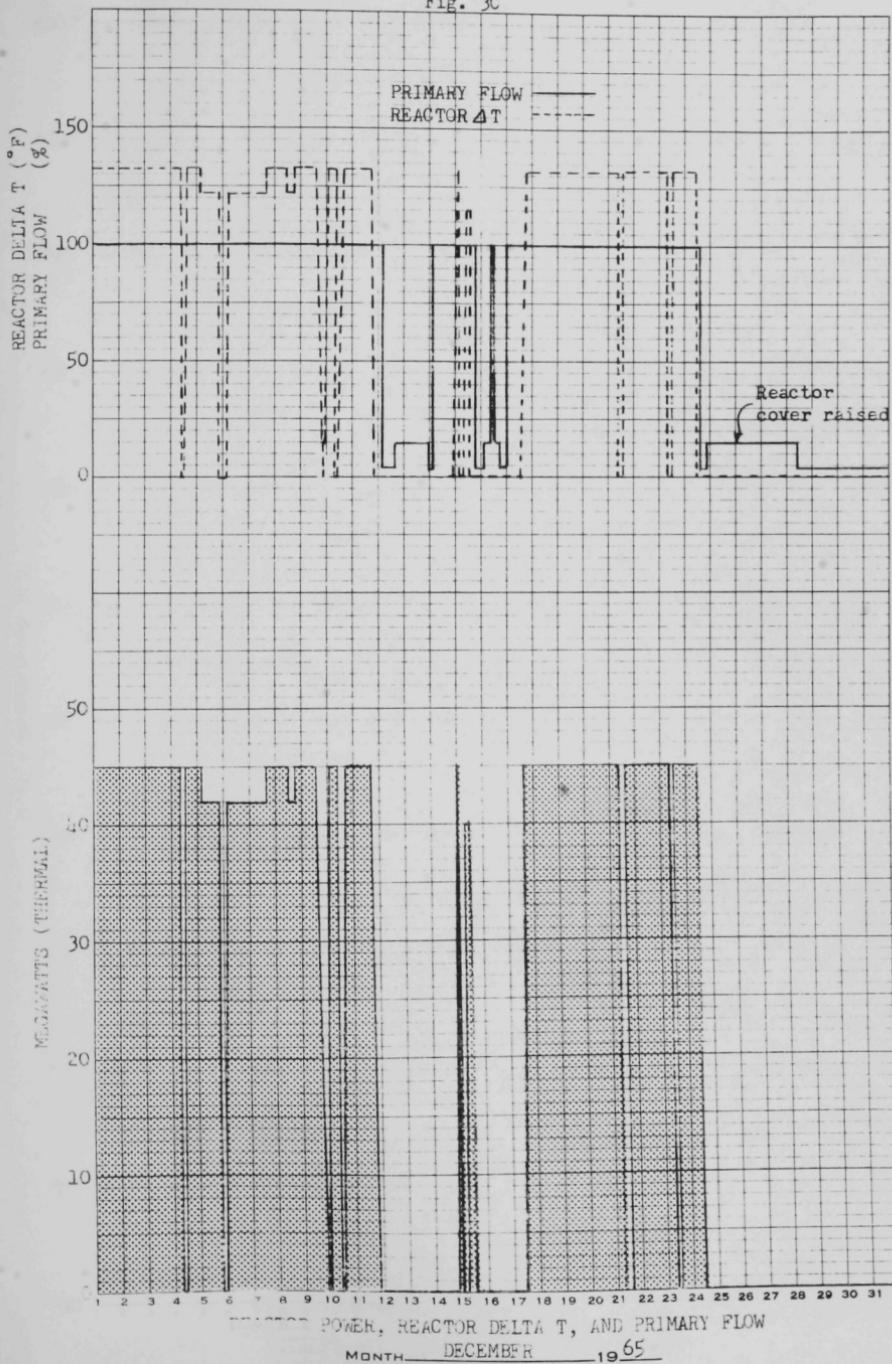




Fig. 4A

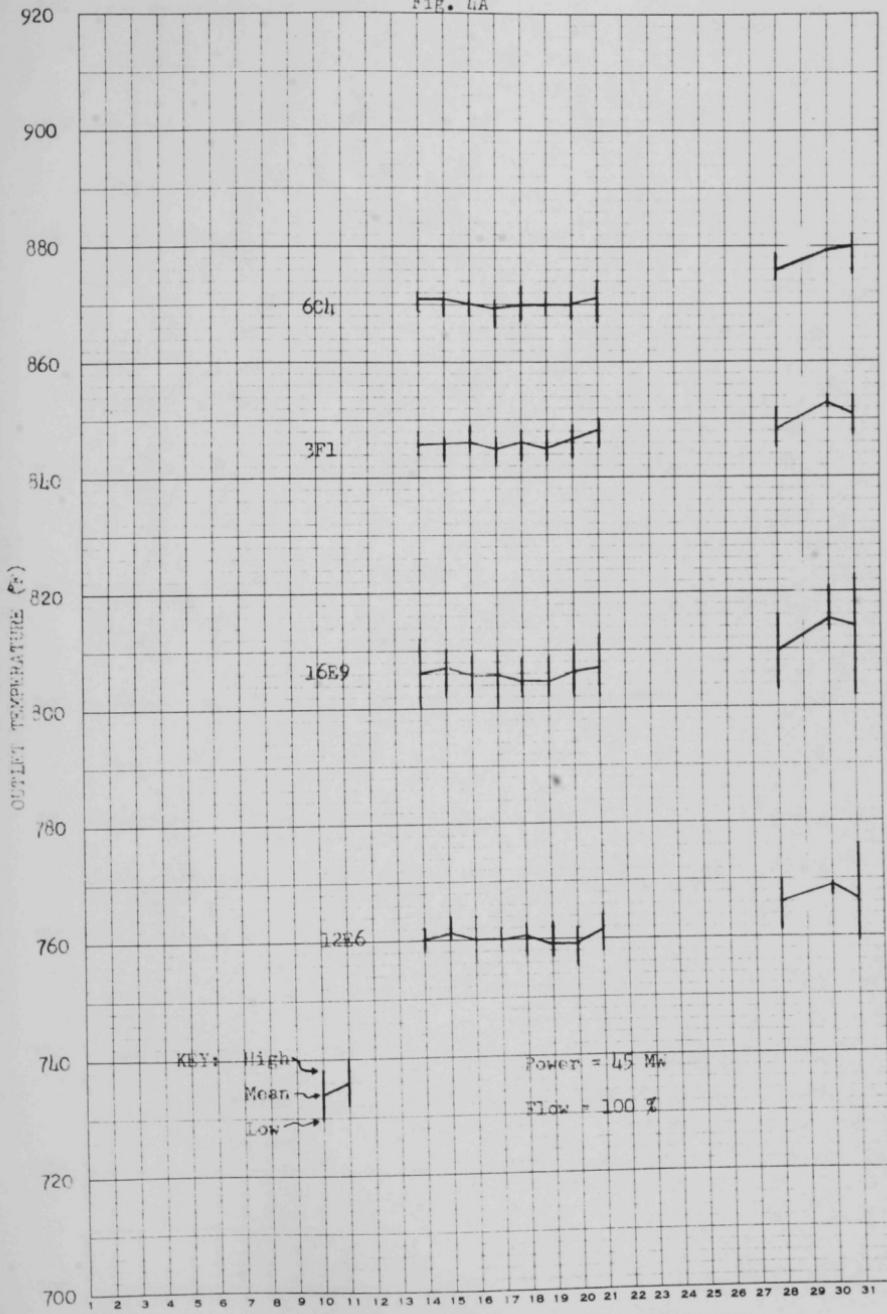




Fig. 4B

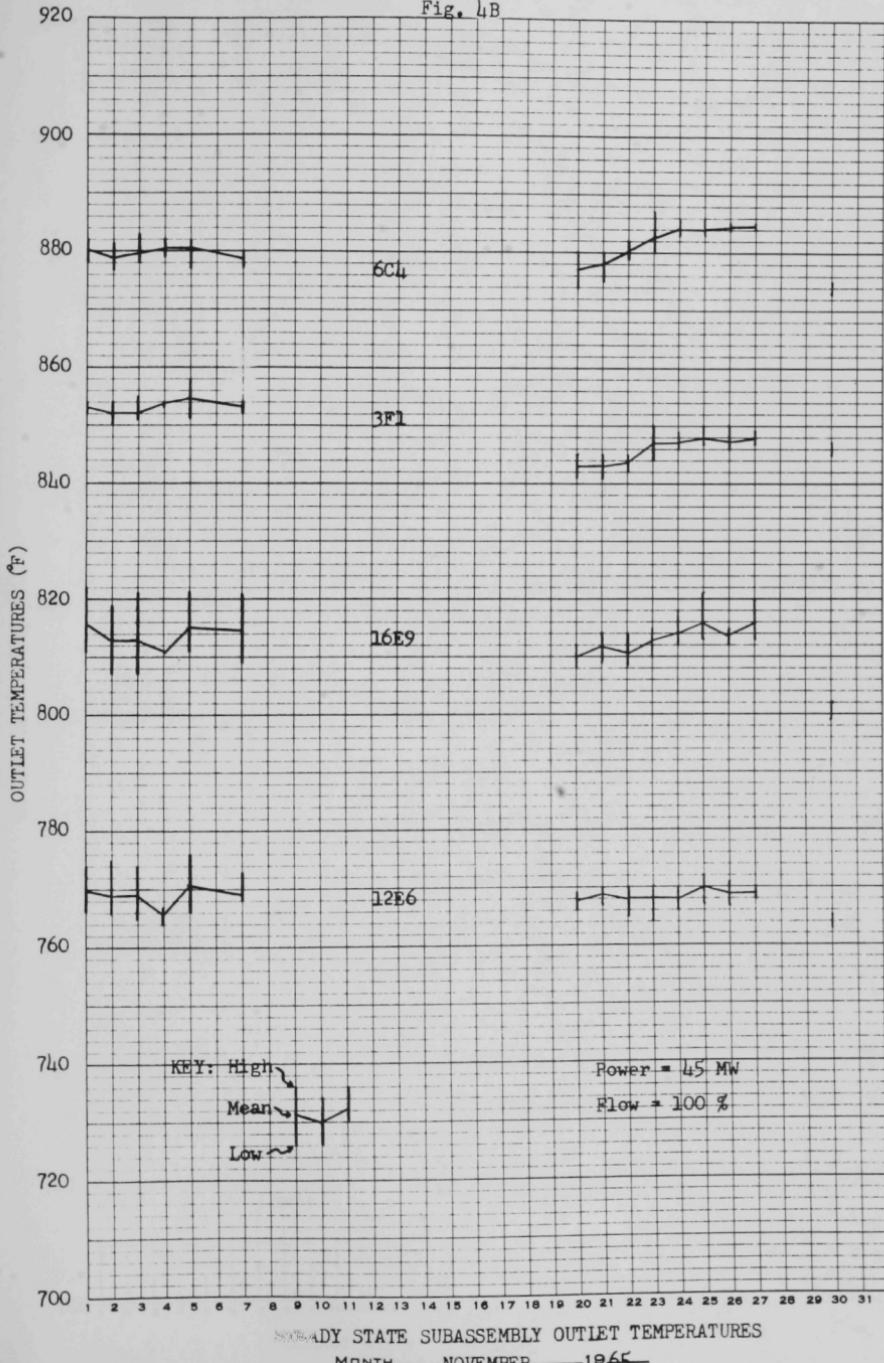




Fig. 4C

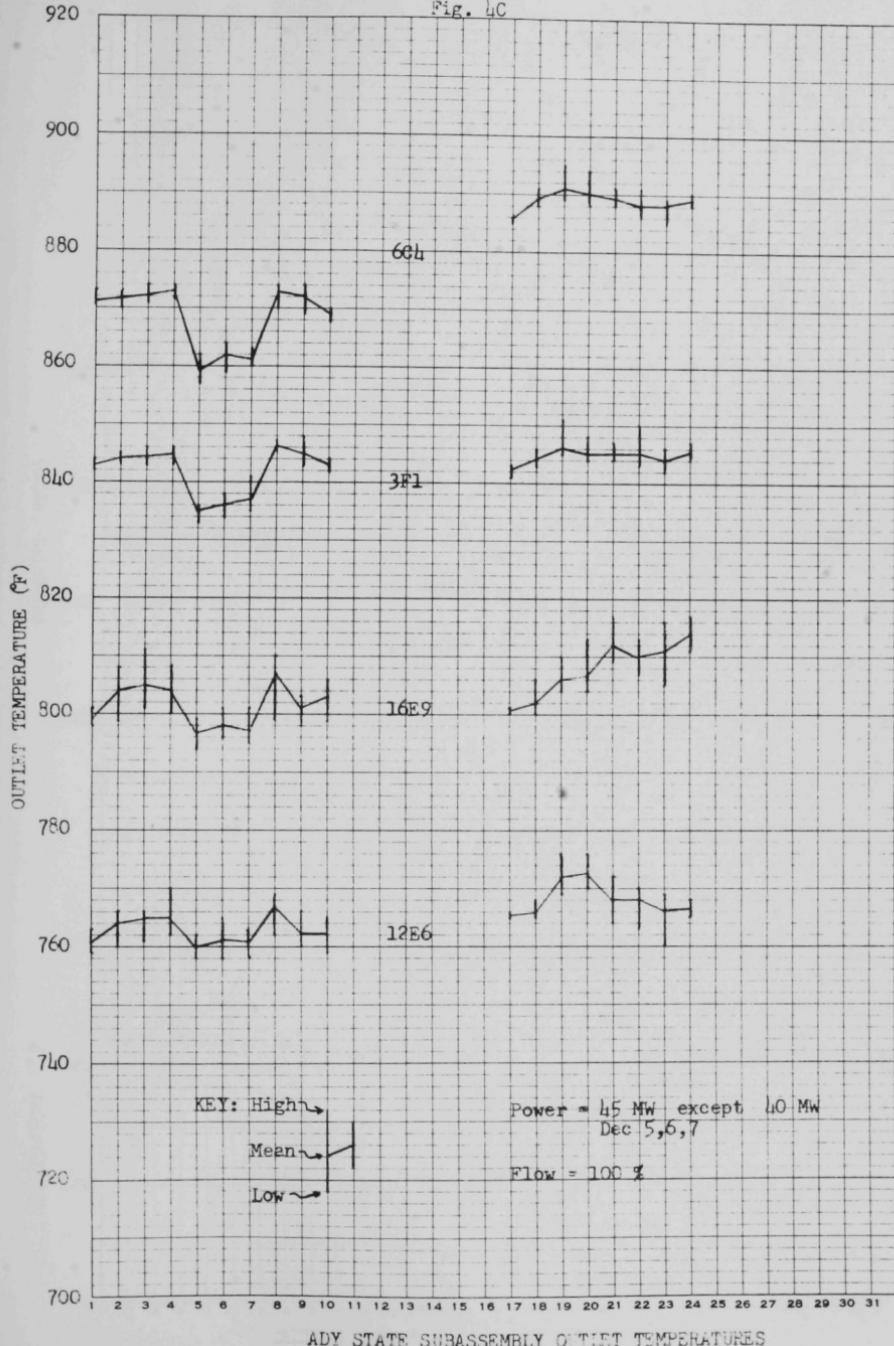
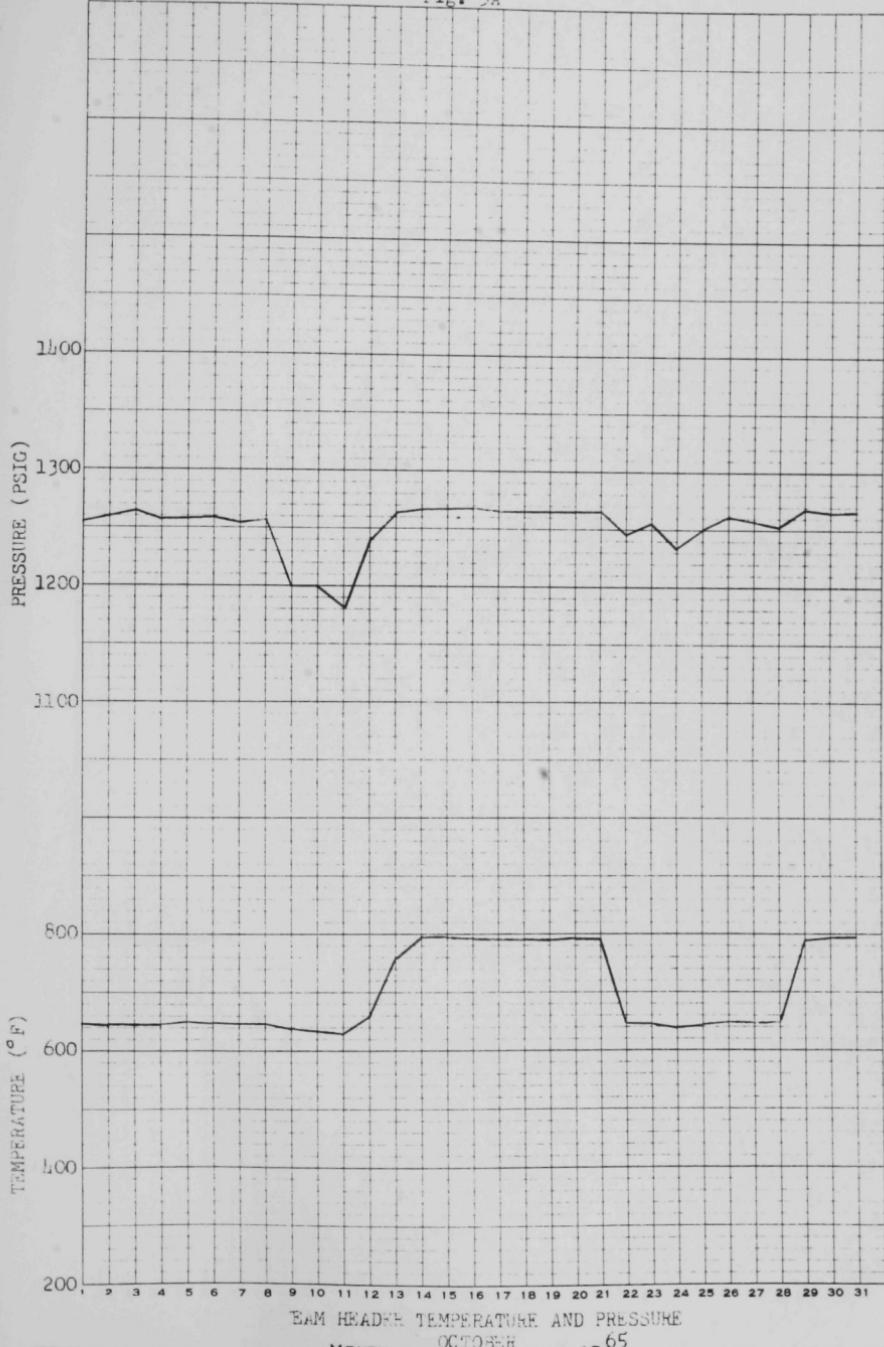




Fig. 5A





A4-58

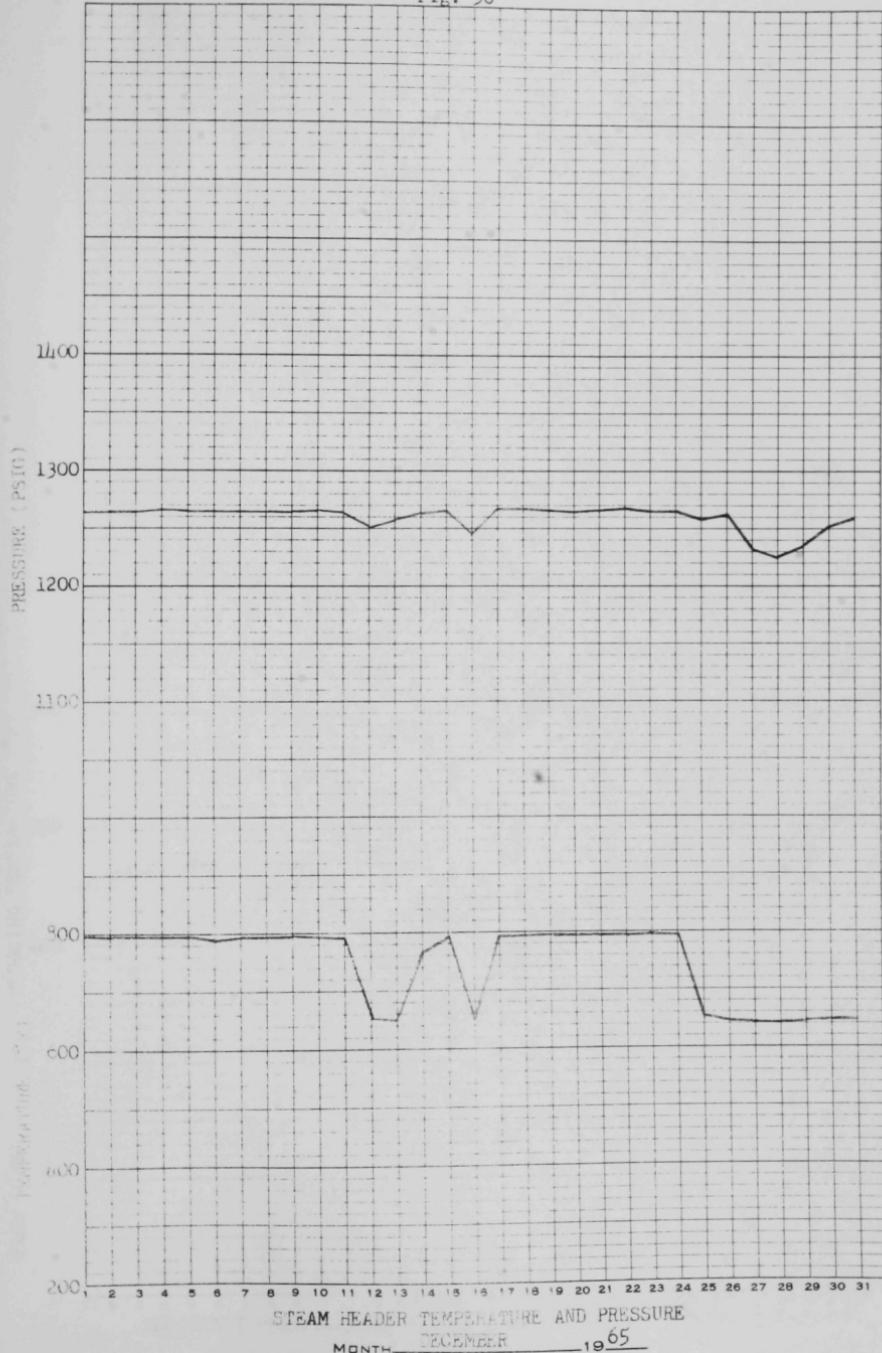


## STEAM HEADER TEMPERATURE AND PRESSURE

NOVEMBER 1965



Fig. 5C



STEAM HEADER TEMPERATURE AND PRESSURE

MONTH DECEMBER 1965



Fig. 6A

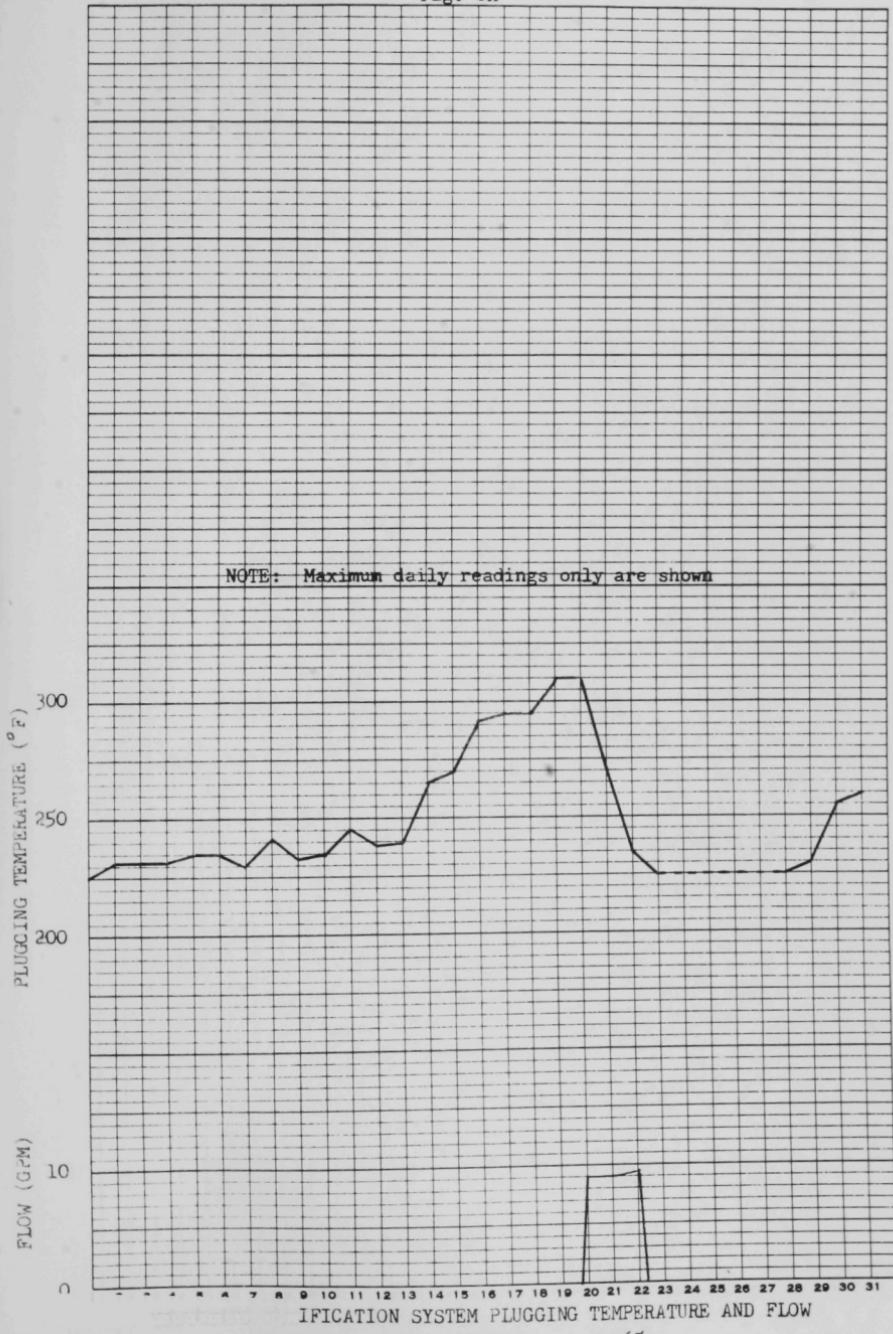




Fig. 6B

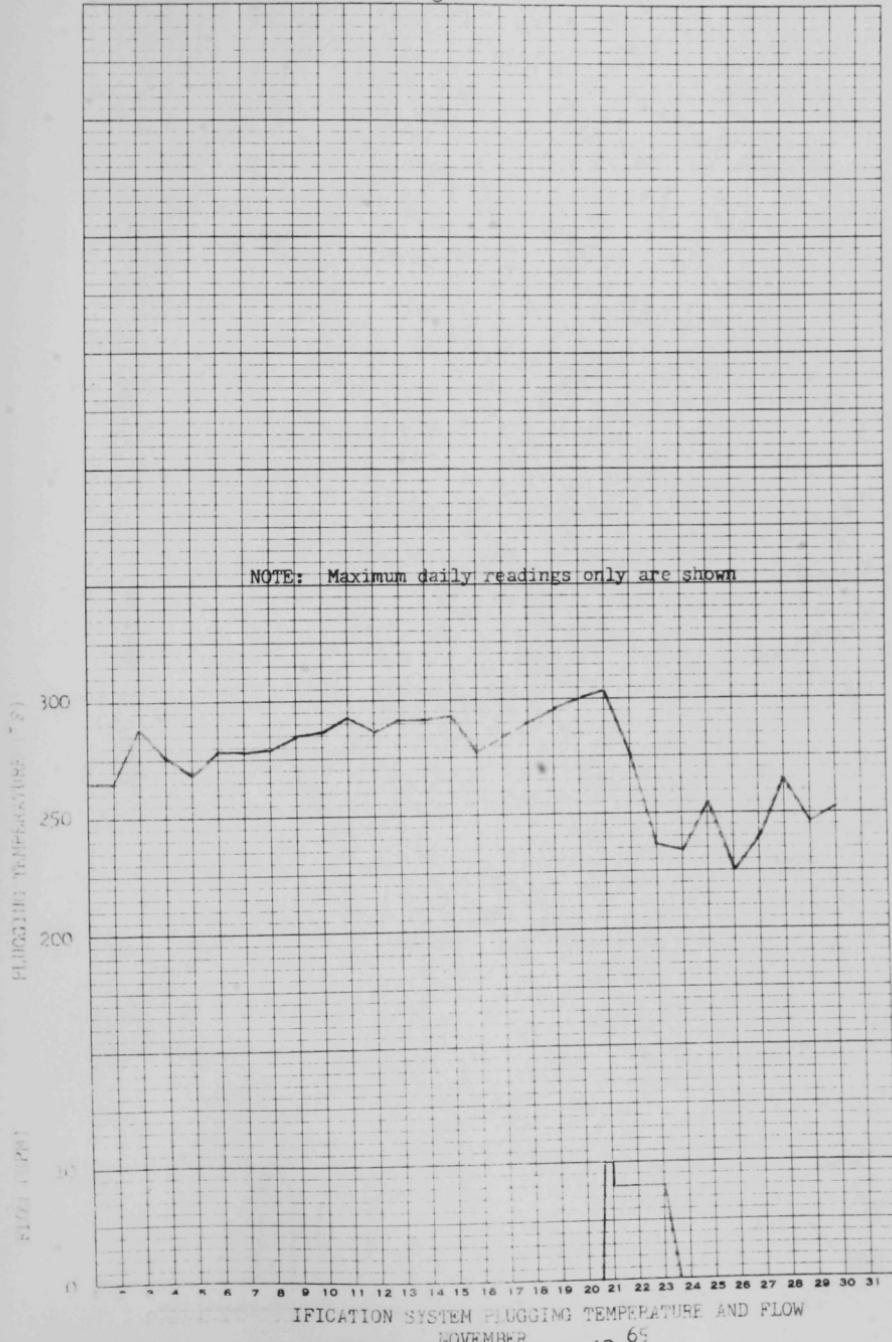




Fig. 6C

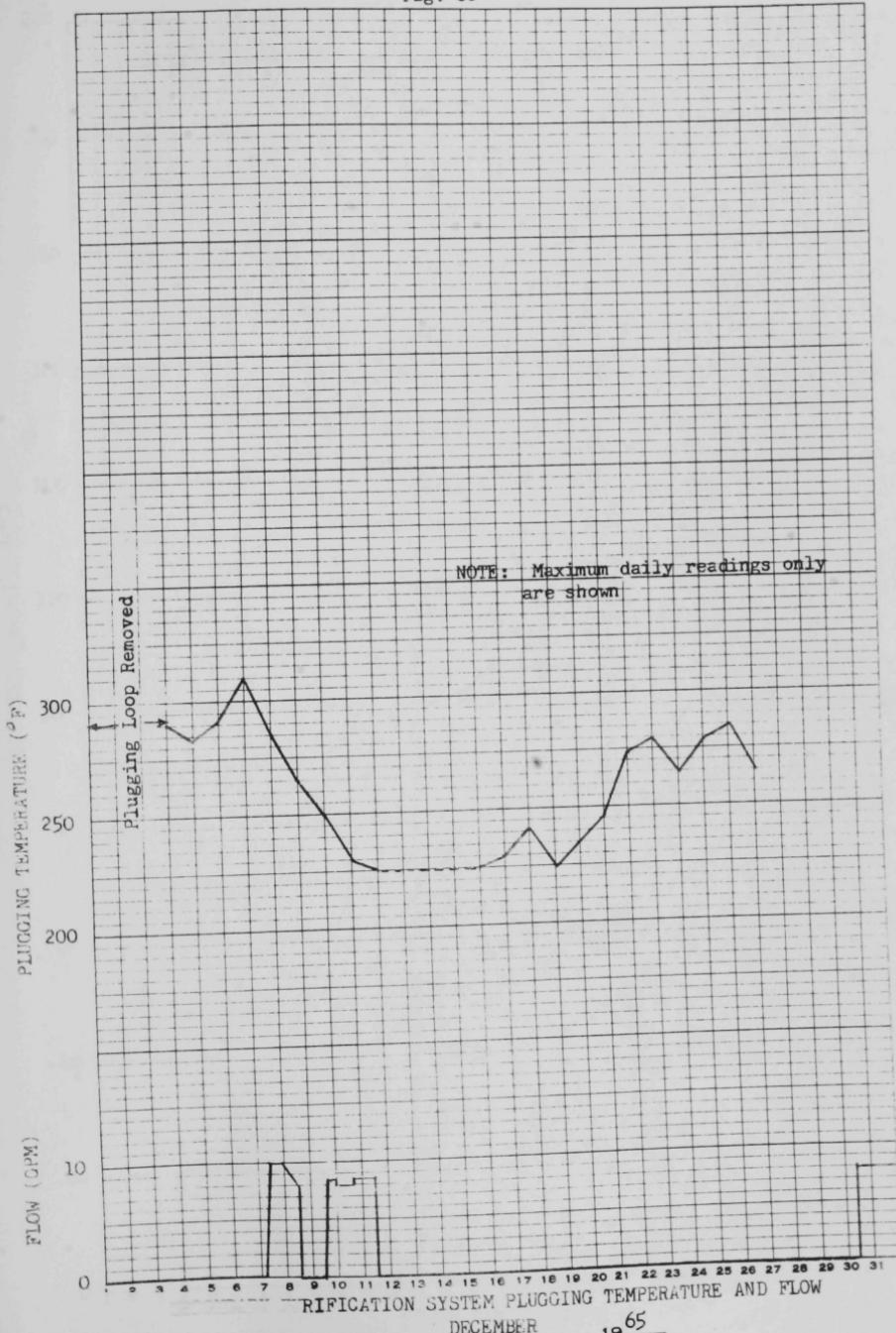




Fig. 7A





Fig. 7B

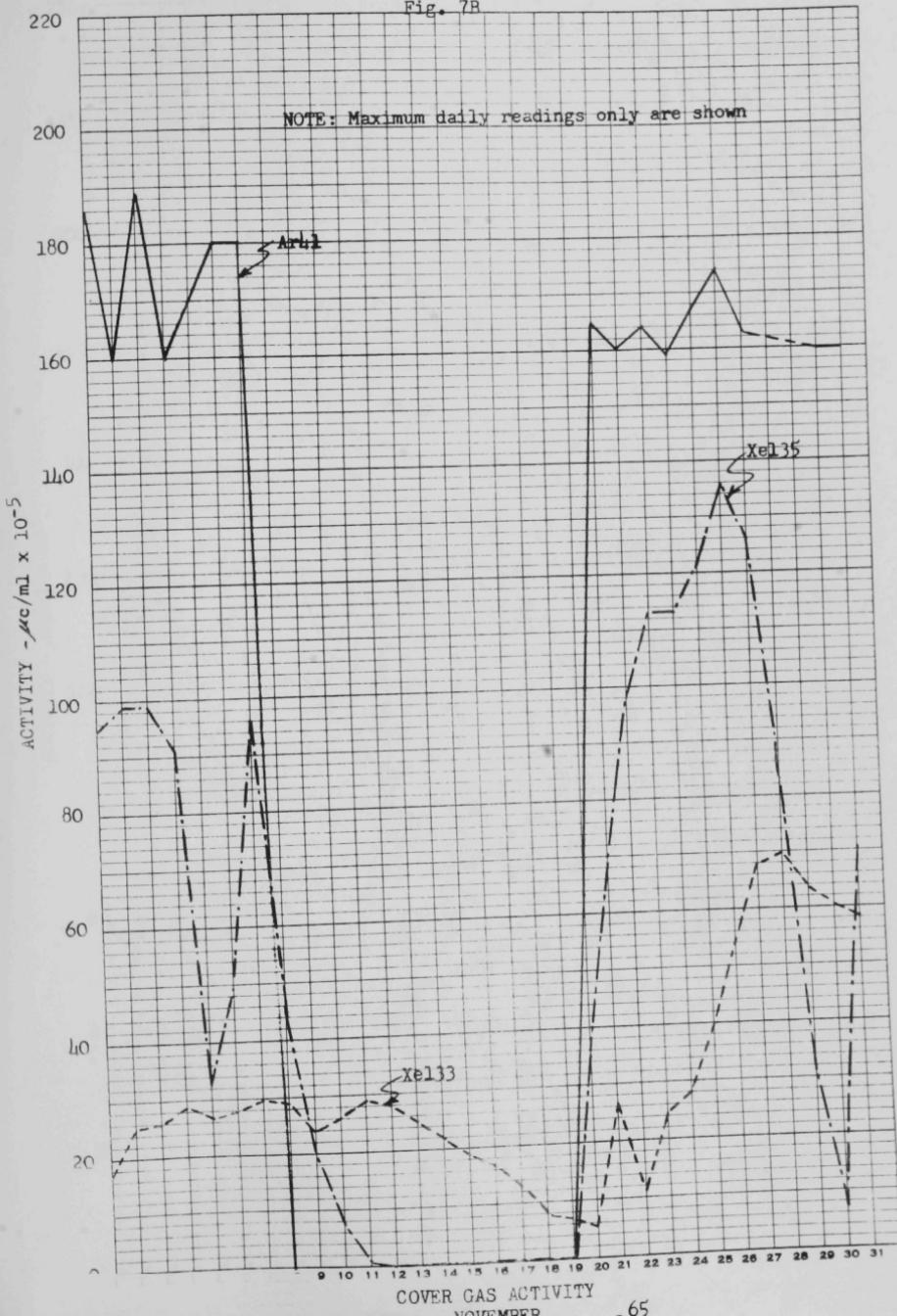




Fig. 7C

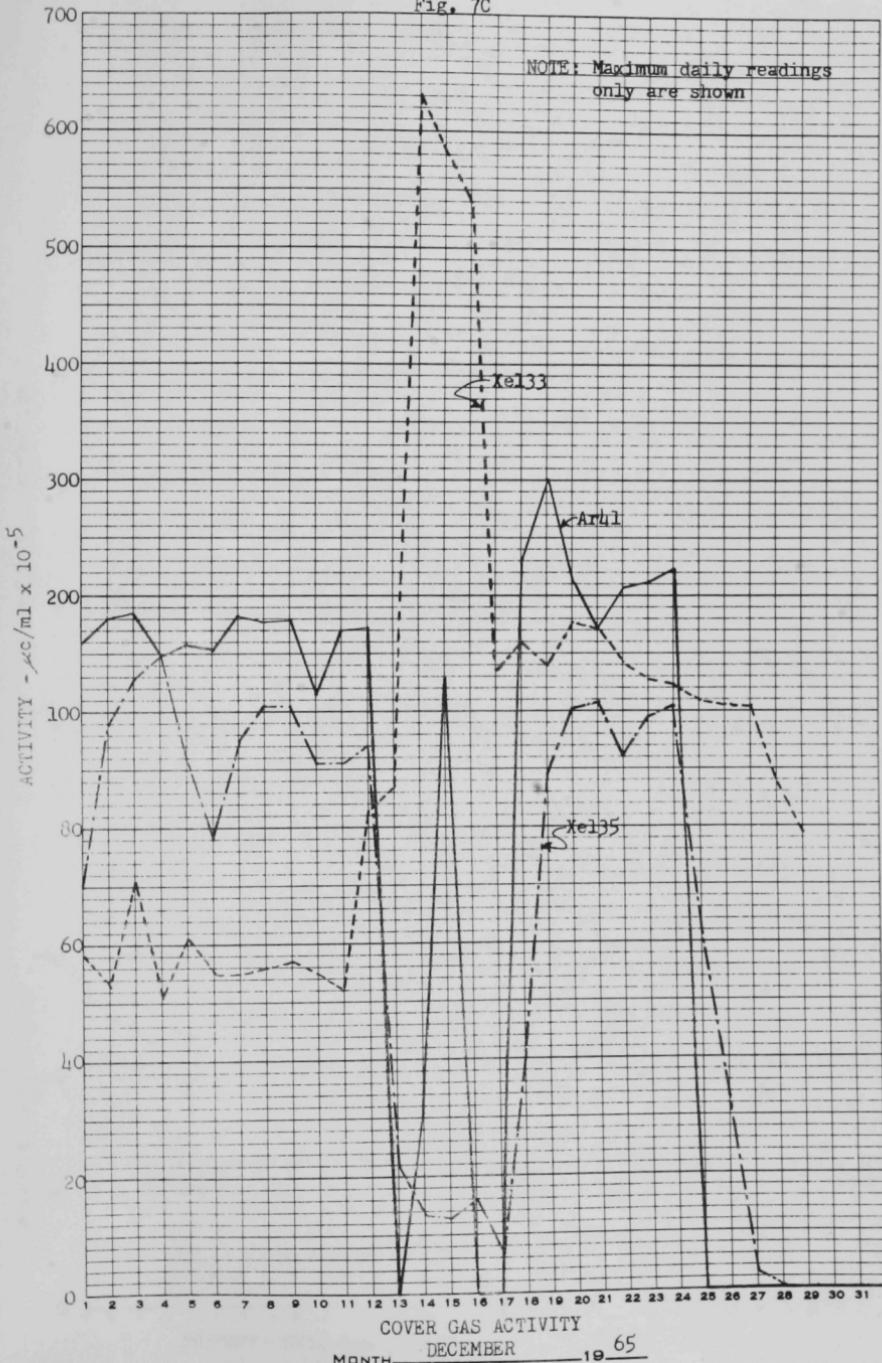




Fig. 8A





Fig. 8B





Fig. 8C

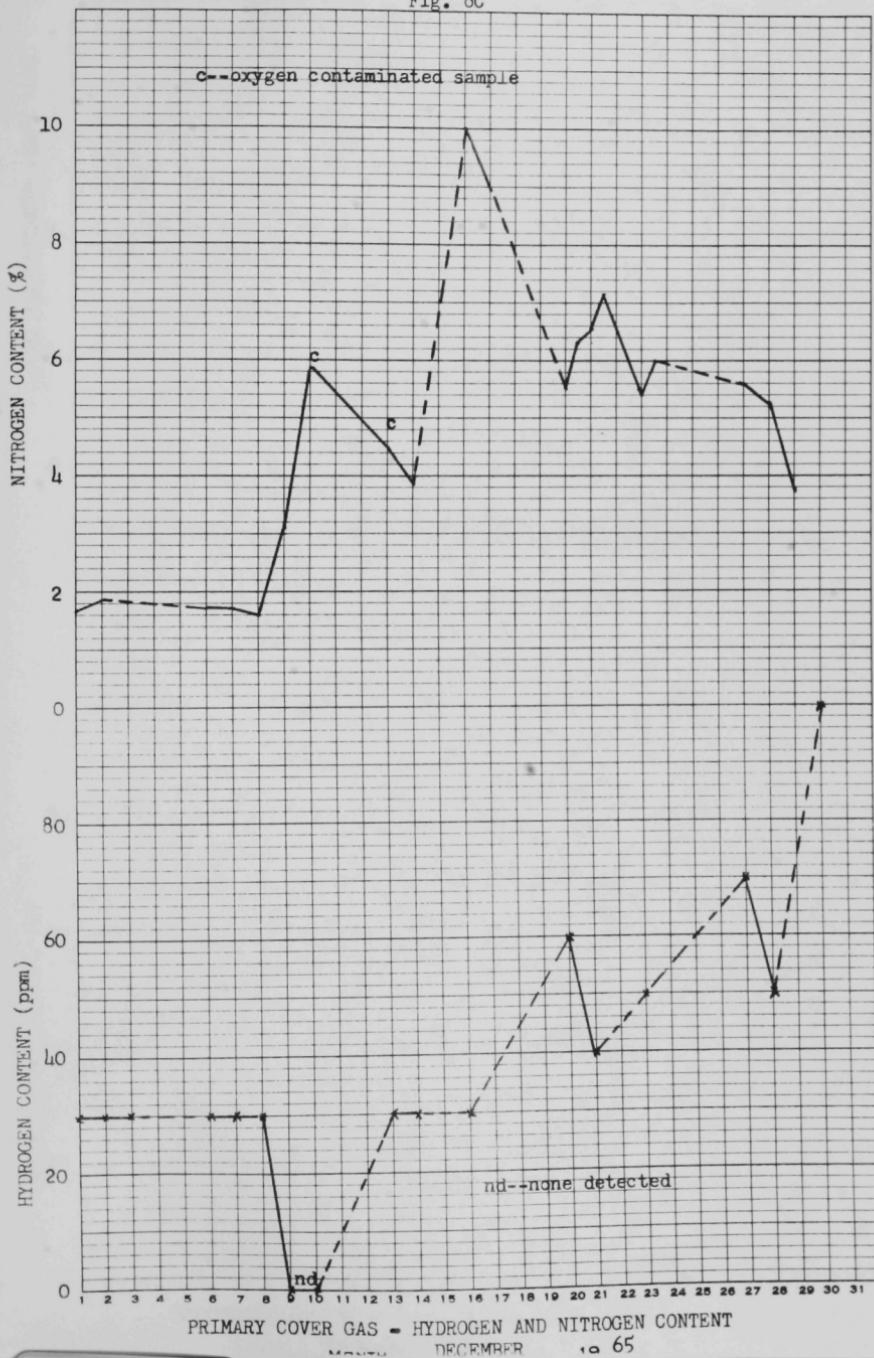




Fig. 9A

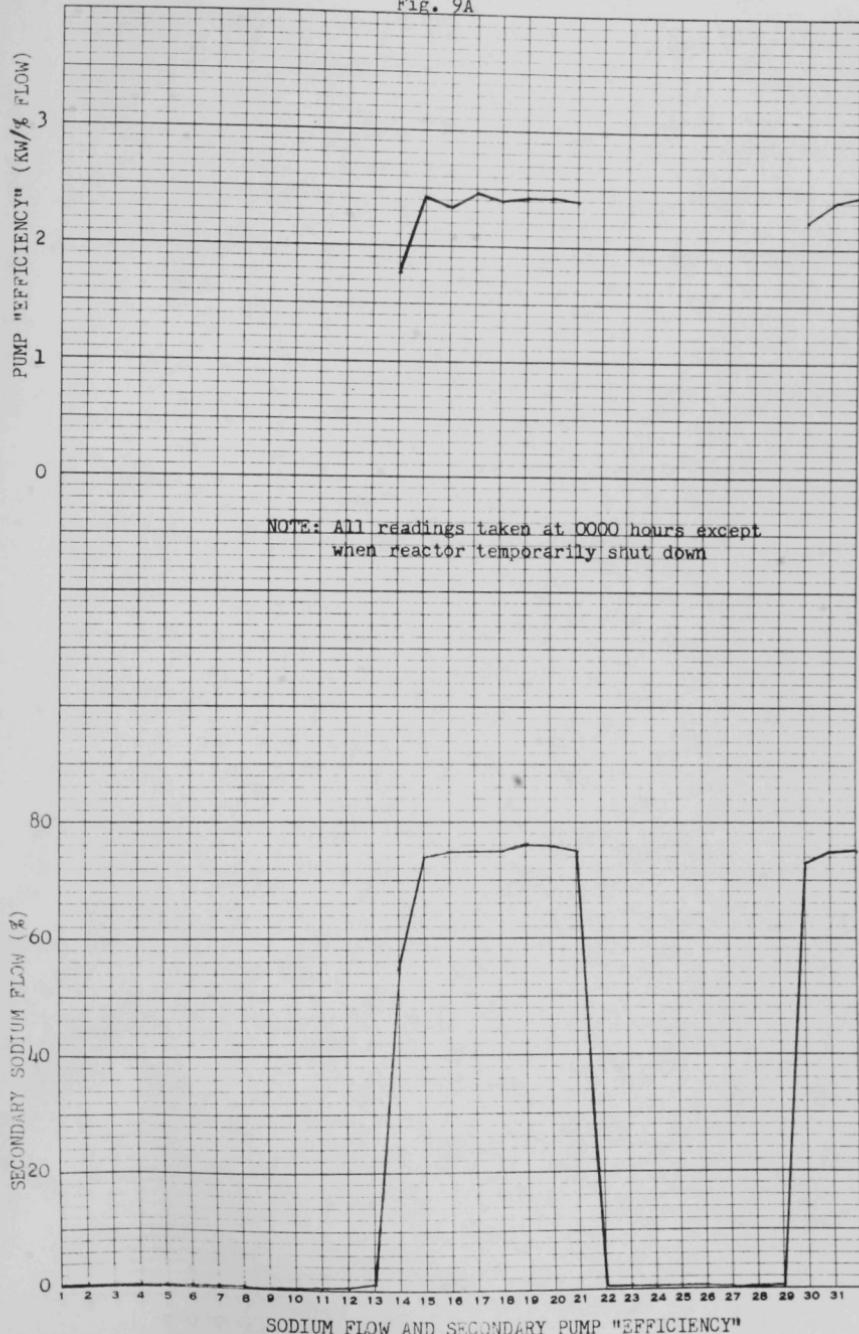




Fig. 9B

PUMPKIN "EFFICIENCY" (KW/% FLOW)

3  
2  
1  
0

NOTE: All readings taken at 0000 hours except  
when reactor temporarily shut down.

SECONDARY SODIUM FLOW (%)

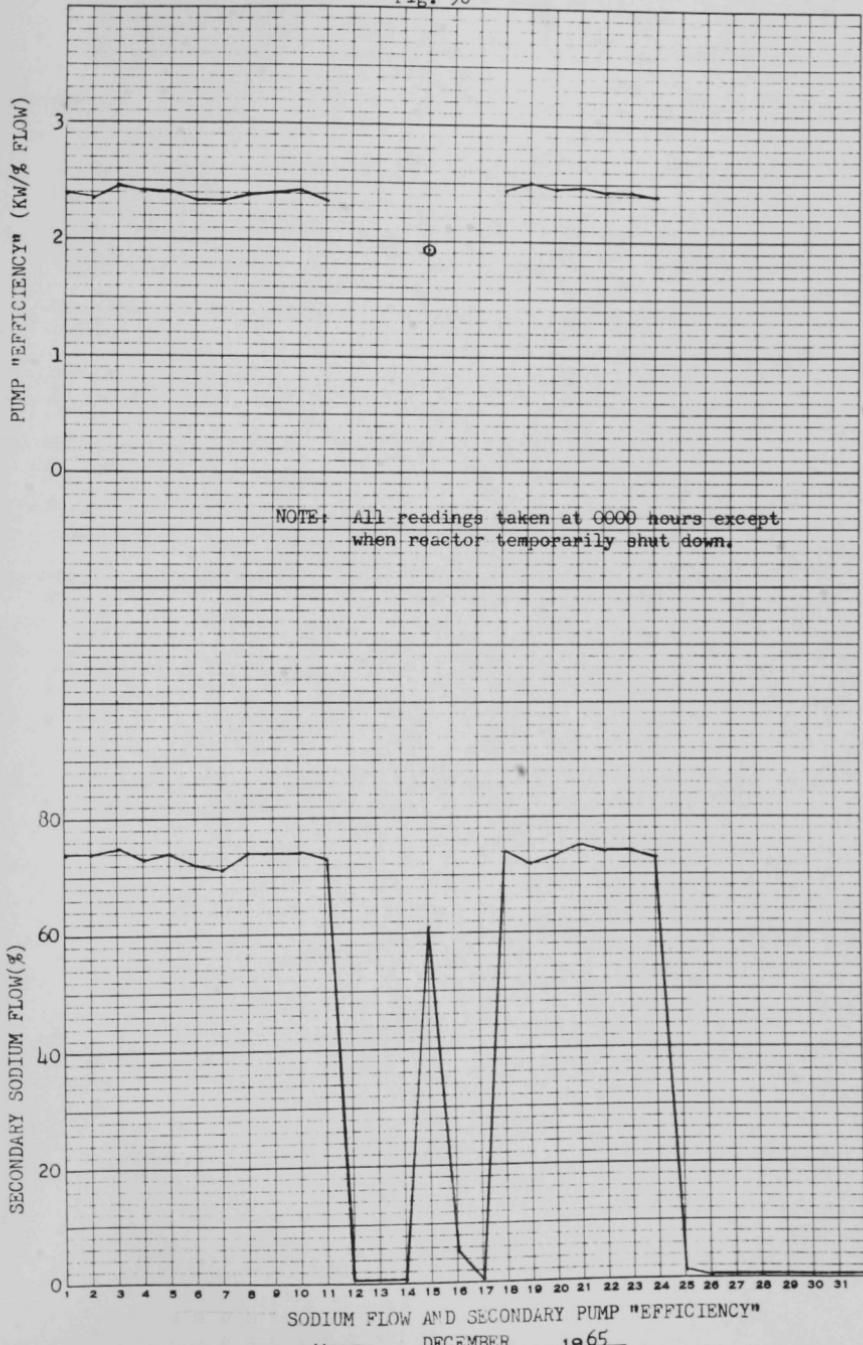
80  
60  
40  
20  
0

SECONDARY SODIUM FLOW AND SECONDARY PUMP "EFFICIENCY"

NOVEMBER 1965



Fig. 9C





References:

1. Report of EBR-II Operating Data (July 1964 to June 1965) Issued August 5, 1965.
2. Report of EBR-II Operating Data (July 1, 1965 through Sept. 30, 1965) Issued October 26, 1965
3. ANL-7115, Reactor Development Program Progress Report, October 1965
4. ANL-7122, Reactor Development Program Progress Report, November 1965
5. ANL-7132, Reactor Development Program Progress Report, December 1965
6. Results of Bonding and Bond Testing Elements of Surveillance Subassembly Nos. C-136 and S-602, Dated August 30, 1965
7. Bond-Testing Results of Fuel Elements from EBR-II Subassembly Nos. C-146, C-148, C-153 and C-154, Dated October 6, 1965
8. Bond-Testing Results of Fuel Elements from EBR-II Subassembly Nos. C-104 (1.16% maximum burnup), Dated October 6, 1965
9. Bond-Testing Results for Fuel Elements from EBR-II Subassembly No. C-139, Dated November 16, 1965
10. Bond Testing Results for Fuel Elements from EBR-II Surveillance Subassembly Nos. C-107, B-306, and C-113, Dated December 6, 1965



ARGONNE NATIONAL LAB WEST



3 4444 00033814 5

✓

X

